USDA United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Kentucky Natural Resources and Environmental Protection Cabinet and Kentucky Agricultural Experiment Station

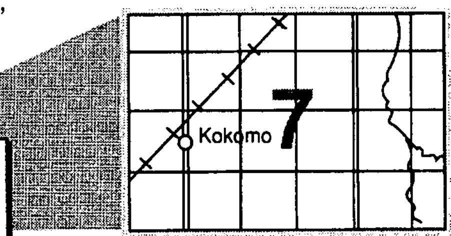
Soil Survey of Floyd and Johnson Counties, Kentucky

How to Use This Soil Survey

General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

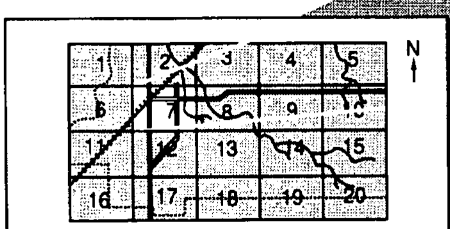
To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.



MAP SHEET

Detailed Soil Maps

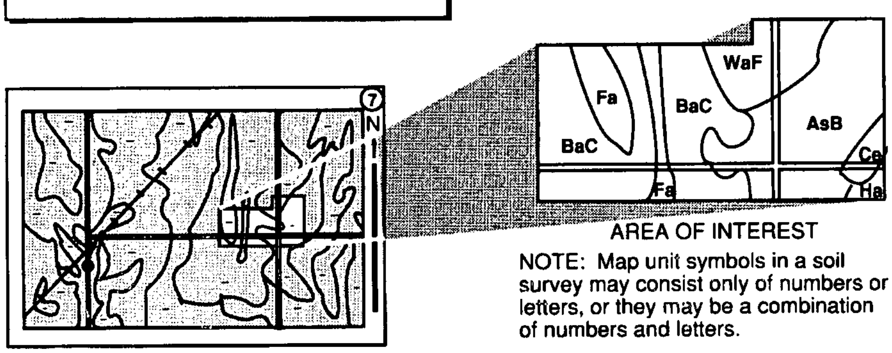
The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



INDEX TO MAP SHEETS

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.



MAP SHEET

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) leads the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1991. Soil names and descriptions were approved in 1991. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1991. This survey was made cooperatively by the Natural Resources Conservation Service, the Kentucky Natural Resources and Environmental Protection Cabinet, and the Kentucky Agricultural Experiment Station. The survey is part of the technical assistance furnished to the Floyd County Conservation District and the Johnson County Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Home sites, pasture, and woodland on Johns Creek near the border of Floyd and Johnson Counties. The soils are in the Hazleton-Fedscreek-Dekalb-Marrowbone general soil map unit.

Contents

Issued 2000

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

David G. Sawyer
State Conservationist
Natural Resources Conservation Service

Soil Survey of
Floyd and Johnson Counties, Kentucky

By Bruce A. Waters and Mitchell Glen Abney, Natural Resources Conservation Service

Fieldwork by By Bruce A. Waters, Mitchell Glen Abney, and Jackie D. McIntosh, Natural Resources Conservation Service, and Steven J. Blanford, Thomas Conner Fristoe, Steve Ibershoff, and Raymond E. Toor, Kentucky Natural Resources and Environmental Protection Cabinet

Maps compiled by Sherry A. Mullins, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
Kentucky Natural Resources and Environmental Protection Cabinet and the Kentucky Agricultural Experiment Station

FLOYD AND JOHNSON COUNTIES are in the Big Sandy River Valley in the eastern part of Kentucky (fig. 1). They are surrounded by Knott, Lawrence, Magoffin, Martin, Morgan, and Pike Counties. The county seat of Floyd County is Prestonsburg and that of Johnson County is Paintsville. In 1980, the population was 48,764 in Floyd County and 24,432 in Johnson County (*27*).

Floyd County takes in 251,494 acres of land and 1,728 acres of water. Johnson County takes in 167,916 acres of land and 1,000 acres of water. Together, the counties cover about 660 square miles (*28*). They are in the Cumberland Plateau and Mountains Land Resource Area (*24*). The elevation ranges from about 2,300 feet in the southern part of Floyd County to about 550 feet, where the Levisa Fork of Big Sandy River leaves Johnson County.

The topography in Floyd County and in the southern and eastern parts of Johnson County consists of steep, rugged, sharp-crested mountains separated by deep coves and narrow valleys. In the northeastern part of Johnson County, the topography is not as steep, the mountains are smaller, and the crests are more rounded. The soils of both counties formed in material weathered from interbedded sandstone, shale, and siltstone. Floyd and Johnson Counties are part of the Mountains and Eastern Coalfields Physiographic Region.

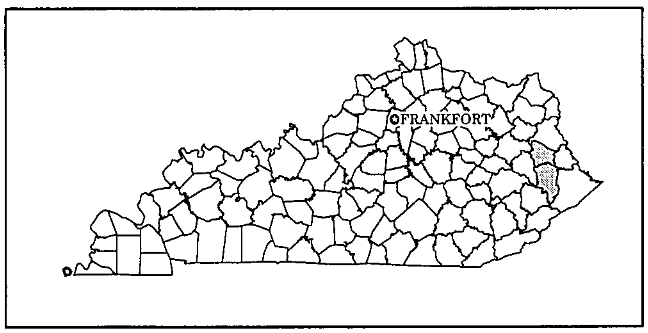


Figure 1.—Location of Floyd and Johnson Counties in Kentucky.

Most of the acreage in both counties is woodland under private ownership. Some large tracts of land belong to mining companies. About 5 percent of the survey area, or 21,855 acres, has been strip mined for coal. The narrow valleys are used intensively for home sites, urban development, pasture, hay, gardens, and some cultivated crops.

This survey updates the soil survey of Floyd and Johnson Counties published in 1965 as part of the Reconnaissance Soil Survey of Fourteen Counties in Eastern Kentucky (*20*). It provides additional and more detailed information.

General Nature of the Counties

This section gives general information on the history and development, climate, transportation and industry, recreation, farming, natural resources, and geomorphology of Floyd and Johnson Counties.

History and Development

Floyd County was established in 1799 from parts of Montgomery, Fleming, and Mason Counties. It was named for Colonel John Floyd, a surveyor for the Transylvania Company, which was an unincorporated organization formed in 1774 to invest in vacant land.

Prestonsburg, originally Preston's Station, was settled in 1791. South of Prestonsburg, the towns were identified with coal mining. They are Garrett, Betsy Layne, Weeksbury, West Prestonsburg, Wheelwright, Martin, Allen, Wayland, Lackey, and Burton.

In winter 1767, Daniel Boone discovered salt springs at David. The Boone Salt Springs were used by the early settlers and, during the Civil War, by both Union and Confederate troops.

Johnson County was established in 1843 from parts of Floyd, Lawrence, and Morgan Counties. It was named for Richard M. Johnson, Vice President under Martin Van Buren, 1837-41.

Paintsville, on Paint Creek, derived from Paint Lick Station established by Colonel John Preston in 1790. Paint Creek was named when an expedition from Virginia, led by Dr. Thomas Walker, discovered Indian paintings on streamside cliffs in June 1750.

Civil War battles were fought on Ivy Mountain (1861) and at Middle Creek (1862) in Floyd and Johnson Counties. At Middle Creek, Union troops under Col. James A. Garfield defeated Confederate forces for control of the Big Sandy River Valley (*12*). Garfield later became the 20th U.S. President.

Climate

Prepared by the National Climatic Data Center, Asheville, North Carolina.

In Floyd and Johnson Counties the summers are hot in the valleys and slightly cooler at the higher elevations. Winters are moderately cold. Rains are fairly heavy and well distributed throughout the year. Snow falls nearly every winter, but snow cover usually lasts only a few days.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Tomahawk, Kentucky, for the period of 1965 to 1985. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 33 degrees F, and the average daily minimum temperature is 20 degrees. The lowest temperature on record, which occurred at Tomahawk on January 21 1985, is -18 degrees. In summer the average temperature is 72 degrees. The highest recorded temperature, which occurred on August 21, 1983, is 102 degrees.

Growing degree days, shown in table 1, are equivalent to heat units. During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 49 inches. Of this, 27 inches, or 55 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 23 inches. The heaviest 1-day rainfall during the period of record was 3.93 inches at Tomahawk on August 8, 1969. Thunderstorms occur on about 54 days each year, and most occur in summer.

Average seasonal snowfall is 25 inches. The greatest snow depth at any time during the period of record was 16 inches. On the average, 17 days have at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in mid afternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The percentage of possible sunshine is 70 percent in summer and 50 percent in winter. The prevailing wind is from the south. Average wind speed is highest, 10 miles per hour, in spring. Heavy rains, which occur at any time of the year, and severe thunderstorms in summer sometimes cause flash flooding, particularly in narrow valleys.

Transportation and Industry

Highway access to Floyd and Johnson Counties has been improving. A network of major highways connects the major communities within these counties to each other and to surrounding areas. U.S. Route 23 connects Ashland, Paintsville, Prestonsburg, and Pikesville. It is a major outlet to the Mountain Parkway and Interstate 64. The highway system makes several new connections between the survey area and all surrounding communities. U.S. Route 460 connects

Paintsville to the Mountain Parkway. Kentucky Route 80 connects Prestonsburg and Hazard. Kentucky Route 3 connects the Prestonsburg area to Inez.

The Chessie System provides freight service to Floyd and Johnson Counties. Amtrak passenger service is available at Ashland, Kentucky.

For commercial air service, Tri-State Airport is located in Huntington, West Virginia. The local airports are Big Sandy Regional Airport on the border of Johnson and Martin Counties and Prestonsburg Airport between Prestonsburg and Paintsville.

The workforce of Floyd and Johnson Counties is mostly employed in mining. In 1990, it totaled about 24,000. Besides mining, it engaged in manufacturing, wholesale and retail trade, transportation and communication, construction, government, and service-related businesses.

Recreation

Floyd and Johnson Counties provide many opportunities for recreation. They support extensive use by residents and visitors alike. Two large lakes have been impounded by the U.S. Army Corps of Engineers for flood control. They also provide fishing, boating, camping, and picnic facilities. In Floyd County, Dewey Lake, in Jenny Wiley State Resort Park, has a large lodge and cabins. The park has hiking trails and an amphitheater that in summer features music and drama. In Johnson County, Paintsville Lake also provides boating and fishing.

Farming

Agriculture was important in Floyd and Johnson Counties early in this century. But since 1950 it has been in steady decline.

The mountains in most of the survey area are too steep and rocky for conventional farm machinery. On mountainsides, the hazard of erosion is severe. Existing farmland is also under pressure from housing, road construction, and industrial development.

In 1988, total cash receipts from farm marketing were $629,000 in Floyd County and $1,649,000 in Johnson County (*9*). Most receipts came from livestock and tobacco sales. Small grains and corn are produced in small quantities for local consumption.

Natural Resources

Besides soil, water, and woodland, the major natural resources in Floyd and Johnson Counties are coal, petroleum, and natural gas.

Coal is the most profitable mineral resource in the survey area (fig. 2). In 1985, coal production was 5,056,046 tons from 138 mines in Floyd County. It was 151,673 tons from 7 mines in Johnson County. In 1986, coal reserves were an estimated 660 million tons in Floyd County and 143 million tons in Johnson County (*10*). Most of the coal is in the highly volatile, bituminous groups A and B. The coal is especially suitable for metallurgical, byproduct coke, gas, ceramic products, cement and lime burning, foundry facing, and domestic trade.

Coal production has steadily increased in Floyd and Johnson Counties since 1961. Coal is used in several electric power plants. The coal industry received a boost from long-term coal contracts. These contracts permitted long-term financing resulting in longlife, mechanical, modern, mined coal handling facilities. The decreasing supply of natural gas and petroleum has increased the demand for coal. These factors have stimulated coal production and lowered the unit price of coal per man-ton.

Most coal mining has been deep mining, contour stripping, auger mining, mountaintop removal, and valley fill. Before mining, the soils were used for woodland. Most mined areas have been reclaimed to grasses, legumes, shrubs, and trees. Nearly level areas have been seeded dominantly to grasses and legumes. Steep outslopes have been planted to several varieties of trees.

The scattered petroleum and natural gas wells belong to the Big Sandy Gas Field. Secondary recovery methods are used for most oil production.

Geomorphology

Erling Gamble, soil scientist, National Soil Survey Investigations Staff, Natural Resources Conservation Service, helped to prepare this section.

From south to north across Floyd and Johnson Counties, steep slopes and high, sharp-crested ridges change into lower, less steep, more rounded forms. Several apparent reasons account for this change in landscapes.

The geology of the survey area lies almost entirely within the Pennsylvanian-age Breathitt Formation (fig. 3). The exception is Paint Creek Valley in Johnson County, where the Lee Formation crops out. The Breathitt Formation consists of interbedded sandstone, shale, siltstone, and coal beds with varying degrees of erodibility (*4*).

Elevations are more than 2,000 feet and relief is about 1,000 feet in the southern part of Floyd County. The ridges in this area are capped with rocks of the middle Breathitt Formation. The bedded sandstone in

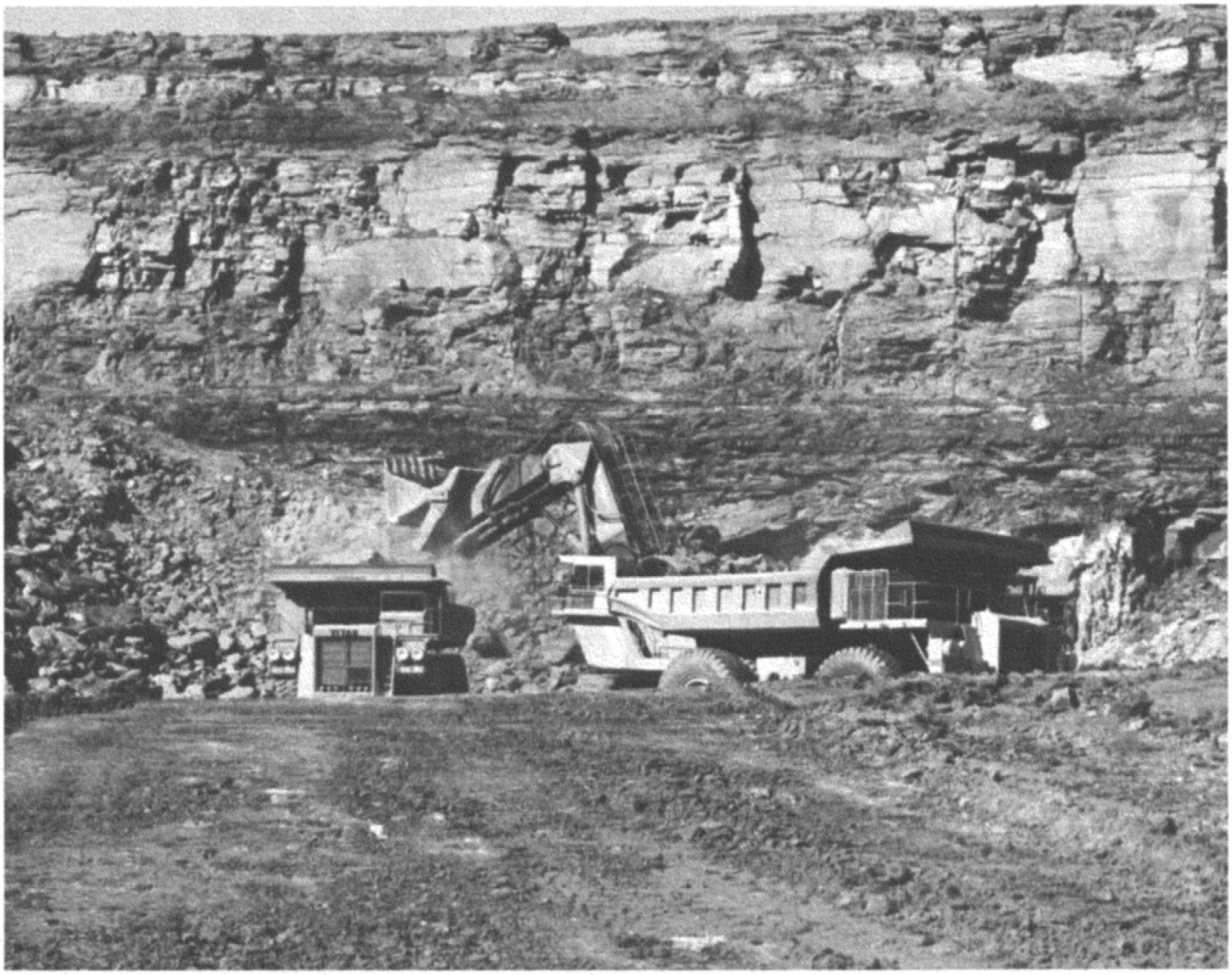


Figure 2.—An active strip mine in an area of Fairpoint-Bethesda complex, 6 to 30 percent slopes.

this area protects the caps. The lower valley slopes are in the lower Breathitt Formation, which consists mainly of clay shale, silty shale, and coal beds (*30,31,32*). The streams in the area have cut into these more erodible materials as deeply as possible relative to their gradient and controlling base level. The deep cutting and the sandstone caps at high elevations together have resulted in narrow valleys and steep valley slopes.

North of this area, in the central and northern parts of Johnson County, ridgetops are commonly about 1,200 feet and relief is 400 to 600 feet. The bedrock in this area consists mainly of the lower Breathitt Formation without the ridge caps of the middle or upper Breathitt Formation. This area is predominantly clay shale, silty shale, and coal beds (*29,30*). These relatively soft and easily eroded materials, especially without a sandstone cap, tend to produce lower, more rounded hills.

The Lee Formation is exposed in the bottom of the Paint Creek Valley in this area. This formation resists erosion and so has prevented deep cutting of the valleys in the drainage basin.

Shale that is more easily erodible makes up the bedrock of the uplands. Resistant sandstone makes up the valleys. The shale and sandstone have further reduced and rounded the hills in this part of the survey area.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and

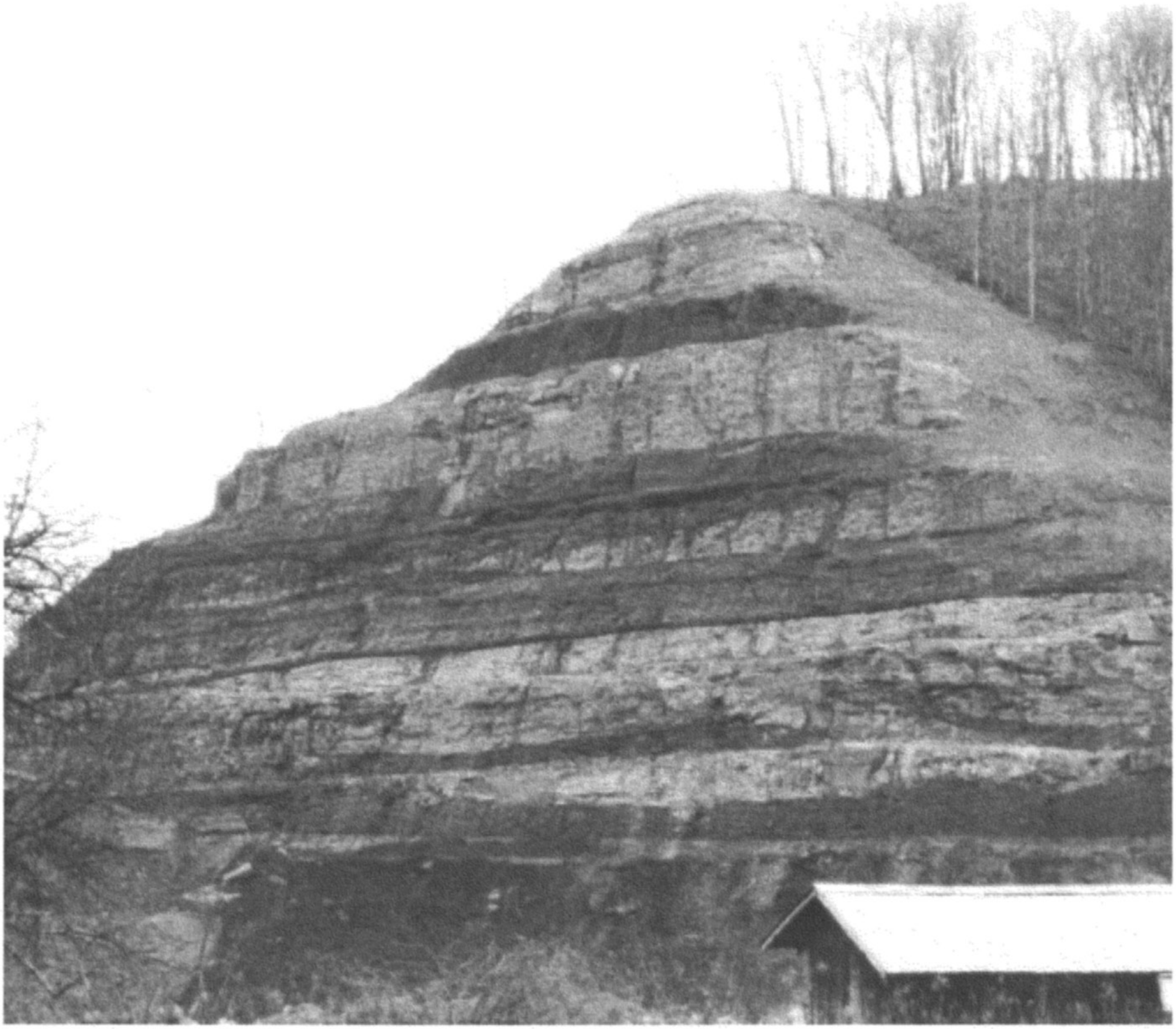


Figure 3.—Interbedded sandstone, siltstone, shale, and coal make up the Breathitt Formation.

miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock (*33*). They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a

concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries (*26*).

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research (*25*).

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

General Soil Map Units

The general soil maps at the back of this publication show broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil maps is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil maps can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the maps. Likewise, areas where the soils are not suitable can be identified.

Because of their small scale, the maps are not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Floyd County

1. Hazleton-Fedscreek-Dekalb-Marrowbone

Very deep to moderately deep, well drained, steep and very steep soils that have a loamy subsoil; on crests, mountainsides, noses, and benches and in coves

This map unit is dominant in the northern and western parts of Floyd County. It consists of steep and very steep, sharp-crested mountains. It is dissected by the Levisa Fork of the Big Sandy River. Slopes range from 20 to 80 percent.

This map unit makes up about 39 percent of Johnson County. It is about 19 percent Hazleton soils, 17 percent Fedscreek soils, 9 percent Dekalb soils, 8 percent Marrowbone soils, and 47 percent soils of minor extent (fig. 4).

Hazleton soils are deep and very deep and well drained. They are on middle and lower mountainsides, on benches, and in coves. They formed in loamy colluvium weathered from sandstone, siltstone, and shale. Typically, the surface layer is dark brown fine sandy loam. The subsoil is light yellowish brown channery sandy loam in the upper part, brownish yellow very channery sandy loam in the middle part, and yellowish brown very flaggy fine sandy loam in the lower part. The substratum is brownish yellow extremely channery fine sandy loam.

Fedscreek soils are deep and very deep and well drained. They are on upper, middle, and lower mountainsides, on benches, and in coves. They formed in loamy colluvium weathered from sandstone, siltstone, and shale. Typically, the surface layer is brown fine sandy loam. The subsoil is yellowish brown loam in the upper part, strong brown loam and channery loam in the middle part, and strong brown and yellowish brown very channery fine sandy loam in the lower part.

Dekalb soils are moderately deep and well drained. They are on upper mountainsides, on noses, and on crests. They formed in loamy residuum weathered from sandstone. Typically, the surface layer is very dark grayish brown sandy loam. The subsurface layer is light yellowish brown channery sandy loam. The subsoil is brownish yellow channery fine sandy loam in the upper part and brownish yellow very channery and extremely channery sandy loam in the lower part.

Marrowbone soils are moderately deep and well drained. They are on upper and middle mountainsides, on noses, and on crests. They formed in loamy residuum or colluvium weathered from sandstone and siltstone. Typically, the surface layer is dark brown fine sandy loam. The subsoil is yellowish brown, brownish yellow, and strong brown fine sandy loam. The substratum is strong brown very channery fine sandy loam.

Kimper, Gilpin, Fairpoint, Bethesda, and Shelocta soils are of minor extent in this unit. Kimper soils are on north- and east-facing, lower mountainsides, on benches, and in coves. Gilpin soils are on upper mountainsides, on crests, and on noses. Fairpoint and

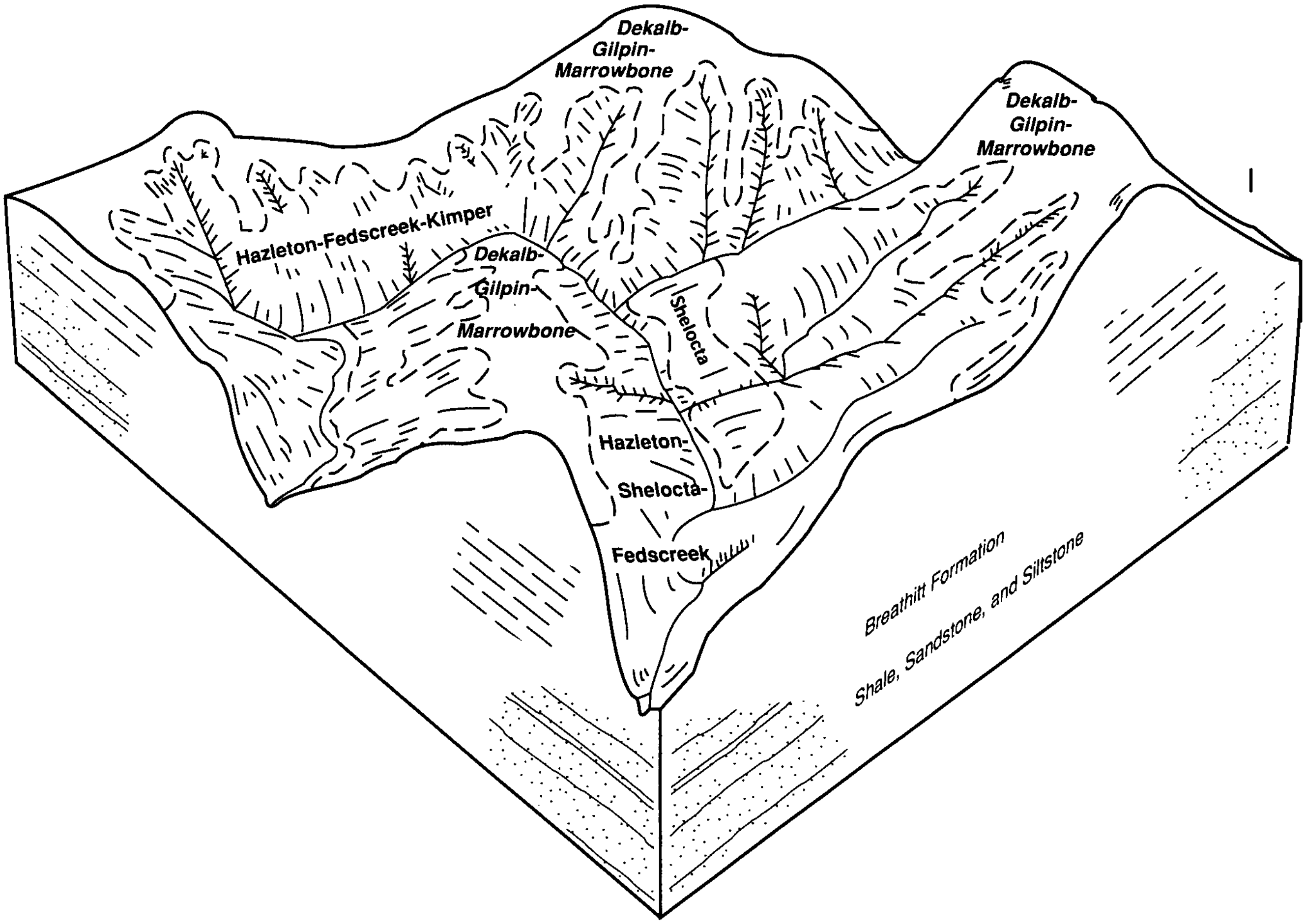


Figure 4.—Relationship of soils to topography and geology in the Hazleton-Fedscreek-Dekalb-Marrowbone general soil map unit.

Bethesda soils are in strip mined areas. Shelocta soils are on lower mountainsides, on benches, and on foot slopes.

The soils of this map unit are used mainly for woodland. Some soils of minor extent on foot slopes are used for pasture, home sites, and gardens.

Except for the sloping and moderately steep soils of minor extent on foot slopes, the soils of this map unit are generally not suited to cultivated crops, hay, or pasture. The main limitations are slope, the erosion hazard, and stones on the surface.

These soils are moderately well suited to woodland. The erosion hazard, equipment limitation, seedling mortality, and plant competition are management concerns. These soils are also suited to habitat for woodland wildlife.

Except for the sloping and moderately steep soils of minor extent on foot slopes, these soils generally are not suited to urban use. Slope is the main limitation.

2. Hazleton-Sharondale-Dekalb-Marrowbone

Very deep to moderately deep, well drained, steep and very steep soils that have a loamy subsoil; on crests, mountainsides, noses, and benches and in coves

This map unit is dominant in the southern and eastern half of Floyd County. It consists of steep and very steep, sharp-crested mountains separated by deep, narrow, nearly level to moderately steep valleys. It is dissected by the Levisa Fork of the Big Sandy River. Slopes range from 20 to 80 percent (fig. 5).

This map unit makes up about 54 percent of Floyd County. It is about 19 percent Hazleton soils, 12 percent Sharondale soils, 10 percent Dekalb soils, 10 percent Marrowbone soils, and 49 percent soils of minor extent (fig. 6).

Hazleton soils are deep and very deep and well drained. They are on middle and lower mountainsides, on benches, and in coves. They formed in loamy colluvium weathered from sandstone, siltstone, and

Figure 5.—Narrow valleys and steep valley slopes are common in the southern part of Floyd County. The soils are the Hazleton-Sharondale-Dekalb-Marrowbone general soil map unit.

shale. Typically, the surface layer is dark brown fine sandy loam. The subsoil is light yellowish brown channery sandy loam in the upper part, brownish yellow very channery sandy loam in the middle part, and yellowish brown very flaggy fine sandy loam in the lower part. The substratum is brownish yellow extremely channery fine sandy loam.

Sharondale soils are very deep and well drained. They are on north- and east-facing lower and middle mountainsides, on benches, and in coves. They formed in loamy colluvium weathered from sandstone, siltstone, and shale. Typically, the surface layer is very dark grayish brown channery loam. The subsoil is dark brown very channery loam in the upper part, dark brown extremely flaggy loam in the middle part, and dark yellowish brown and brown very channery loam and yellowish brown extremely flaggy fine sandy loam in the lower part. The substratum is yellowish brown very channery fine sandy loam.

Dekalb soils are moderately deep and well drained. They are on upper mountainsides, on noses, and on crests. They formed in loamy residuum weathered from sandstone. Typically, the surface layer is very dark grayish brown sandy loam. The subsurface layer is light yellowish brown channery sandy loam. The subsoil is brownish yellow channery fine sandy loam in the upper part and brownish yellow very channery and extremely channery sandy loam in the lower part.

Marrowbone soils are moderately deep and well drained. They are on upper mountainsides, on noses, and on crests. They formed in loamy residuum or colluvium weathered from sandstone and siltstone. Typically, the surface layer is dark brown fine sandy loam. The subsoil is yellowish brown, brownish yellow, and strong brown fine sandy loam. The substratum is strong brown very channery fine sandy loam.

The soils of minor extent are Fedscreek, Kimper, Gilpin, Myra, Potomac, Grigsby, and Shelocta soils. Fedscreek and Kimper soils are on mountainsides, on benches, and in coves. Gilpin soils are on upper mountainsides, on crests, and on noses. Myra soils are in strip mined areas. Potomac and Grigsby soils are on flood plains. Shelocta soils are on foot slopes.

The soils of this map unit are used mainly for woodland. Some soils of minor extent on foot slopes, stream terraces, and flood plains are used for pasture, home sites, and gardens.

Except for some nearly level to moderately steep soils of minor extent on flood plains and foot slopes, these soils are generally not suited to cultivated crops, hay, or pasture. The main limitations are slope, the erosion hazard, and stones on the surface.

The soils in this map unit are moderately well suited to woodland. The erosion hazard, equipment limitation, seedling mortality, and plant competition are

management concerns. These soils are also suited to habitat for woodland wildlife.

Except for some sloping and moderately steep soils of minor extent on foot slopes, these soils are generally not suited to urban uses. Slope is the main limitation.

3. Grigsby-Udorthents-Shelocta

Deep and very deep, well drained, nearly level to moderately steep soils that have a loamy subsoil or that have underlying layers of loamy material; on flood plains, in reconstructed valleys, and on foot slopes and colluvial fans

This map unit is on flood plains, in reconstructed valleys, and on foot slopes and colluvial fans. It is along the major tributaries of the Levisa Fork of the Big Sandy River in Floyd County. It consists of long, winding, narrow flood plains and reconstructed valleys dissected by many small foot slopes and colluvial fans. Slopes range from 0 to 15 percent.

This map unit makes up about 6 percent of Floyd County. It is about 36 percent Grigsby soils, 27 percent Udorthents, 21 percent Shelocta soils, and 16 percent soils of minor extent.

Grigsby soils are very deep and well drained. They are on flood plains. They formed in mixed alluvium from sandstone, siltstone, and shale. Typically, the surface layer is dark yellowish brown fine sandy loam. The subsoil is dark yellowish brown and yellowish brown fine sandy loam. The substratum is dark yellowish brown, stratified sandy loam and fine sandy loam.

Udorthents are very deep and well drained. They are in reconstructed valleys. About 20 percent of Udorthents are in built-up, urban areas. These soils formed in mixed soil and rock fragments taken from areas of road construction. The properties of these soils vary greatly.

Shelocta soils are deep and very deep and well drained. They are on foot slopes and colluvial fans. They formed in mixed colluvium weathered from shale, siltstone, and sandstone. Typically, the surface layer is yellowish brown loam. The subsoil is yellowish brown and brownish yellow loam in the upper part, yellowish brown channery silt loam in the middle part, and yellowish brown, mottled channery loam in the lower part. The substratum is light olive brown, mottled very channery loam.

Of minor extent in this map unit are Stokly soils on flood plains and Allegheny, Knowlton, Chavies, and Cotaco soils on stream terraces.

The soils in this map unit are used mainly for cultivated crops, hay, and pasture. Many areas are used for residential and commercial sites.

The nearly level and gently sloping areas of Grigsby and Allegheny soils are well suited to cultivated crops. The sloping and moderately steep areas of Shelocta soils are better suited to hay or pasture. On Shelocta soils, the main limitations are slope, the erosion hazard, and flooding in low areas.

Grigsby and Shelocta soils are well suited to woodland. Plant competition is the main management concern. In most areas these soils are suited to habitat for openland wildlife.

In most areas these soils are poorly suited to most urban uses because of flooding. Shelocta soils on foot slopes and colluvial fans are suited to urban use. Udorthents are contrasting and variable in this map unit. They are subject to irregular settling. Because of Udorthents, onsite investigation is needed to determine the suitability and limitations of any proposed use of this unit.

4. Allegheny-Nelse-Udorthents

Very deep, well drained, gently sloping to steep soils that have a loamy subsoil or that have underlying layers of loamy material; on stream terraces, alluvial fans, and streambanks and in reconstructed valleys

This map unit is in broad valleys along the Levisa Fork of the Big Sandy River in Floyd County. It consists of long, winding, gently sloping to moderately steep stream terraces and reconstructed valleys breaking into short, gently sloping to steep, alluvial side slopes along riverbanks. Slopes range from 0 to 25 percent, but short, steeper areas are along the upper edge of riverbanks. Prestonsburg is located in this map unit.

This map unit makes up about 1 percent of Floyd County. It is about 30 percent Allegheny soils, 30 percent Nelse soils, 22 percent Udorthents, and 18 percent soils of minor extent.

Allegheny soils are very deep and well drained. They are on stream terraces and alluvial fans. They formed in mixed alluvium derived from sandstone, siltstone, and shale. Typically, the surface layer is dark yellowish brown loam. The subsoil is yellowish brown loam in the upper part, yellowish brown, mottled loam and fine sandy loam in the middle part, and yellowish brown fine sandy loam in the lower part. The substratum is yellowish brown, mottled sandy loam.

Nelse soils are very deep and well drained. They are on streambanks. They formed in sandy alluvium. Typically, the surface layer is dark brown loam that has strata of loamy fine sand. In the upper part the underlying material is brown and dark brown fine sandy loam that has sand bedding planes. In the lower part it is dark grayish brown and dark brown loamy fine sand that has fine sand bedding planes.

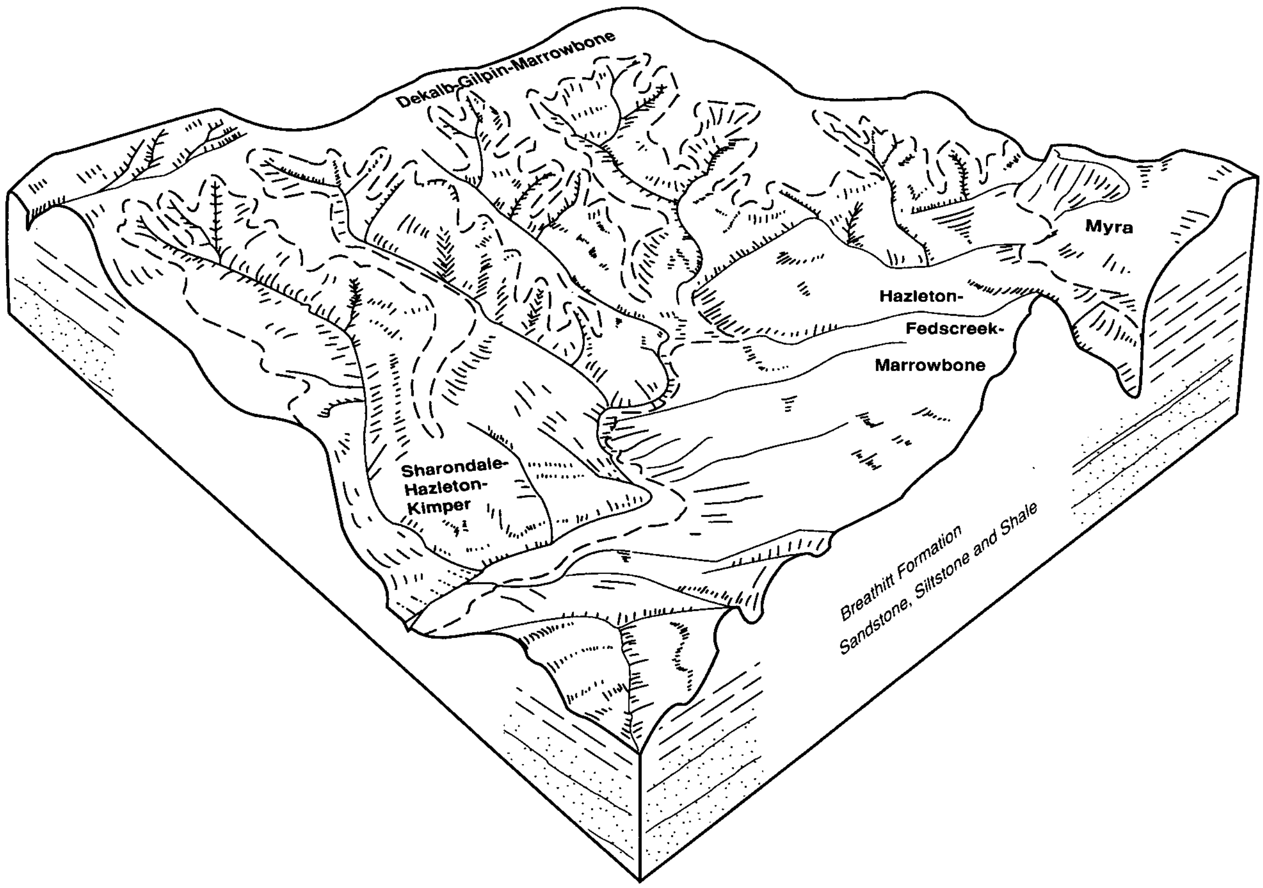


Figure 6.—Relationship of soils to topography and geology in the Hazleton-Sharondale-Dekalb-Marrowbone general soil map unit.

Udorthents are very deep and well drained. They are in reconstructed valleys. About 20 percent of Udorthents are in built-up, urban areas. Udorthents formed in mixed soil and rock material brought in from areas of road construction. The properties of Udorthents vary greatly.

Of minor extent in this map unit are Grigsby soils on flood plains and Knowlton, Cotaco, and Chavies soils on stream terraces.

The soils of this map unit are used mainly for residential and commercial development. Some areas are used for cultivated crops, hay, and pasture. Small tracts of woodland are in wet areas and on steep riverbanks.

In the nearly level and gently sloping areas, Nelse and Allegheny soils are well suited to cultivated crops. In more sloping areas they are best suited to hay, pasture, or woodland. The main limitations are slope, the erosion hazard, and flooding in low areas.

Nelse and Allegheny soils are well suited to woodland. Seedling mortality and plant competition are management concerns. The equipment limitation is a management concern in the steeper areas of Nelse soils. Nelse and Allegheny soils are also suited to habitat for openland wildlife.

These soils are suited to some urban uses. Flooding is a limitation. Slope is a limitation in the steeper areas of Nelse and Allegheny soils. Udorthents are contrasting and variable in this map unit. They are subject to irregular settling. Because of them, onsite investigation is needed to determine the suitability and limitations for any proposed use of this map unit.

Johnson County

1. Fedscreek-Hazleton-Shelocta-Gilpin

Very deep to moderately deep, well drained, sloping to very steep soils that have a loamy subsoil; on crests, noses, mountainsides, benches, and foot slopes and in coves

This map unit is dominant in the northern and western parts of Johnson County. It consists of steep

and very steep, smooth-crested mountains. Slopes range from 0 to 80 percent.

This map unit makes up about 40 percent of Johnson County. It is about 20 percent Fedscreek soils, 17 percent Hazleton soils, 12 percent Shelocta soils, 12 percent Gilpin soils, and 39 percent soils of minor extent (fig. 7).

Fedscreek soils are deep and very deep and well drained. They are on upper, middle, and lower mountainsides and benches and in coves. They formed in loamy colluvium weathered from sandstone, siltstone, and shale. Typically, the surface layer is brown fine sandy loam. The subsoil is yellowish brown loam in the upper part, strong brown loam and channery loam in the middle part, and strong brown and yellowish brown very channery fine sandy loam in the lower part.

Hazleton soils are deep and very deep and well drained. They are on middle and lower mountainsides and benches and in coves. They formed in loamy colluvium weathered from sandstone, siltstone, and shale. Typically, the surface layer is brown fine sandy loam. The subsoil is light yellowish brown channery sandy loam in the upper part, brownish yellow very channery sandy loam in the middle part, and yellowish brown very flaggy fine sandy loam in the lower part. The substratum is brownish yellow extremely channery fine sandy loam.

Shelocta soils are deep and very deep and well drained. They are on lower side slopes on mountains and on benches, foot slopes, and colluvial fans. They formed in mixed colluvium weathered from shale, siltstone, and sandstone. Typically, the surface layer is yellowish brown loam. The subsoil is yellowish brown and brownish yellow loam in the upper part, yellowish brown channery silt loam in the middle part, and yellowish brown mottled channery loam in the lower part. The substratum is light olive brown mottled very channery loam.

Gilpin soils are moderately deep and well drained. They are on mountainsides, noses, and crests. They formed in residuum weathered from interbedded shale, siltstone, and sandstone. Typically, the surface layer is brown loam. The subsoil is yellowish brown loam that has mottles in the lower part. The substratum is yellowish brown very channery loam.

Of minor extent in this map unit are Bethesda, Fairpoint, Marrowbone, Rayne, and Rigley soils and Rock outcrop. Bethesda and Fairpoint soils are in strip mined areas. Marrowbone soils are on crests and upper side slopes. Rayne soils are on ridges of foothills. Rigley soils and Rock outcrop are on very steep, lower side slopes.

The soils in this map unit are used mainly for woodland. On the less sloping crests and foot slopes, they are used for pasture and home sites.

Except for some sloping and moderately steep soils of minor extent on the ridges of foothills, these soils are generally not suited to cultivated crops, hay, or pasture. The main limitations are slope, the erosion hazard, and stones on the surface.

These soils are moderately well suited to woodland. The erosion hazard, equipment limitation, seedling mortality, and plant competition are management concerns. They are also suited to habitat for woodland wildlife.

Except for the sloping and moderately steep soils of minor extent on ridges of foothills, these soils are generally not suited to urban uses. Slope is the main limitation.

2. Hazleton-Fedscreek-Dekalb-Marrowbone

Very deep to moderately deep, well drained, steep and very steep soils that have a loamy subsoil; on crests, mountainsides, noses, and benches and in coves

This map unit is dominant in the eastern and southern parts of Johnson County. It consists of steep and very steep, sharp-crested mountains. It is dissected from north to south by the Levisa Fork of the Big Sandy River. Slopes range from 20 to 80 percent.

This map unit makes up about 53 percent of Johnson County. It is about 20 percent Hazleton soils, 17 percent Fedscreek soils, 9 percent Dekalb soils, 9 percent Marrowbone soils, and 45 percent soils of minor extent.

Hazleton soils are deep and very deep and well drained. They are on middle and lower mountainsides and benches and in coves. They formed in loamy colluvium weathered from sandstone, siltstone, and shale. Typically, the surface layer is dark brown fine sandy loam. The subsoil is light yellowish brown channery sandy loam in the upper part, brownish yellow very channery fine sandy loam in the middle part, and yellowish brown very flaggy fine sandy loam in the lower part. The substratum is brownish yellow extremely channery fine sandy loam.

Fedscreek soils are deep and very deep and well drained. They are on upper, middle, and lower mountainsides and benches and in coves. They formed in loamy colluvium weathered from sandstone, siltstone, and shale. Typically, the surface layer is brown fine sandy loam. The subsoil is yellowish brown loam in the upper part, strong brown loam or channery loam in the middle part, and strong brown and yellowish brown very channery fine sandy loam in the lower part.

Dekalb soils are moderately deep and well drained.

They are on upper mountainsides, on noses, and on crests. They formed in loamy residuum derived from sandstone. Typically, the surface layer is very dark grayish brown sandy loam. The subsurface layer is light yellowish brown channery sandy loam. The subsoil is brownish yellow channery fine sandy loam in the upper part and brownish yellow very channery and extremely channery sandy loam in the lower part.

Marrowbone soils are moderately deep and well drained. They are on upper and middle mountainsides, on noses, and on crests. They formed in loamy residuum or colluvium derived from sandstone and siltstone. Typically, the surface layer is dark brown fine sandy loam. The subsoil is yellowish brown, brownish yellow, and strong brown fine sandy loam. The substratum is strong brown very channery fine sandy loam.

Of minor extent in this map unit are Kimper, Gilpin, Bethesda, Fairpoint, and Shelocta soils. Kimper soils on north- and east-facing, lower mountainsides, on benches, and in coves. Gilpin soils are on mountainsides, crests, and noses. Bethesda and Fairpoint soils are in areas of surface mining. Shelocta soils are on lower mountainsides, on benches, and on foot slopes.

These soils are used mainly for woodland. Some soils of minor extent on foot slopes and colluvial fans are used for pasture, home sites, and gardens.

Except for some of the sloping and moderately steep minor soils on foot slopes, these soils are generally not suited to cultivated crops, hay, or pasture. The main limitations are slope, the erosion hazard, and stones on the surface.

These soils are moderately well suited to woodland.

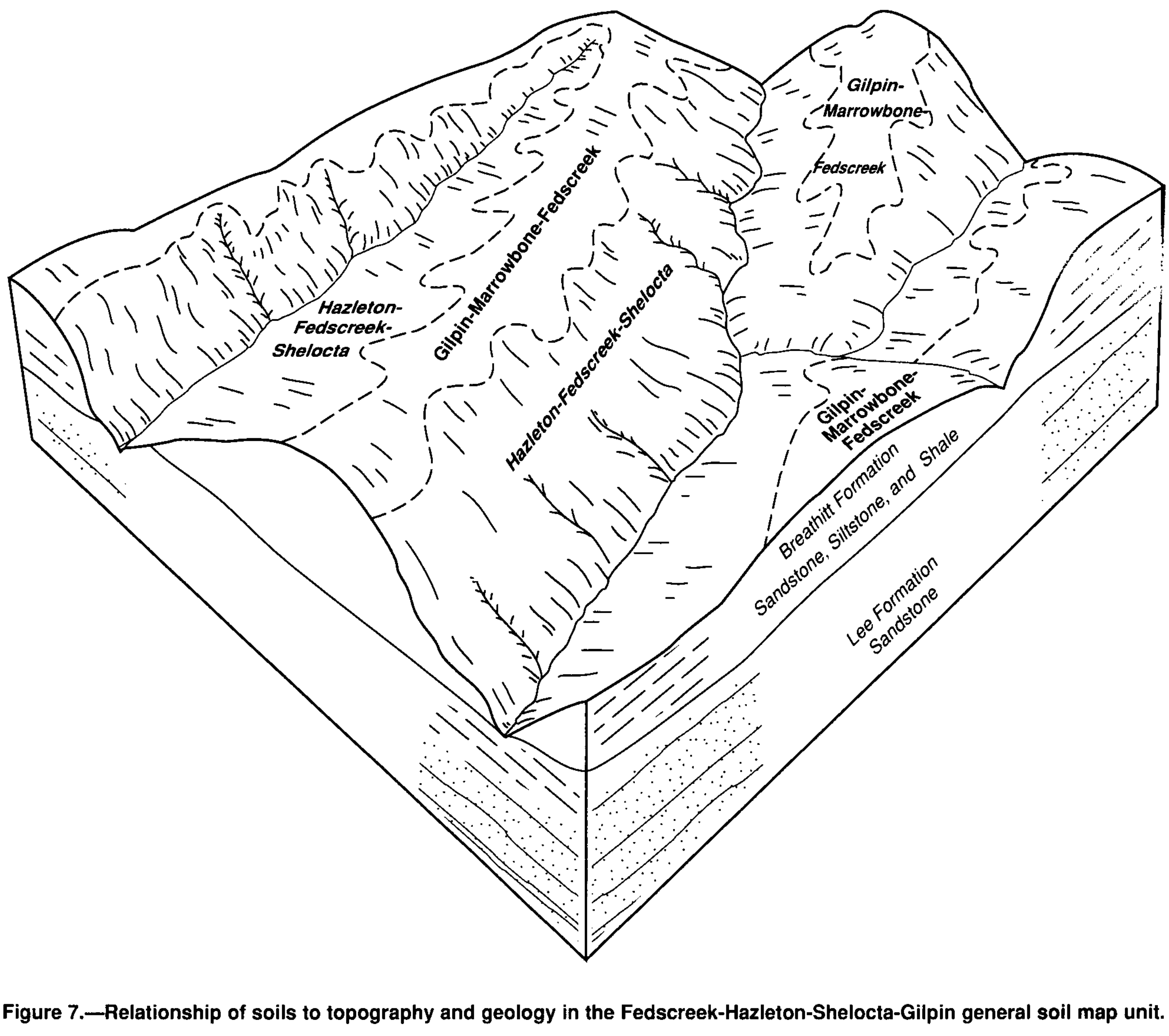


Figure 7.—Relationship of soils to topography and geology in the Fedscreek-Hazleton-Shelocta-Gilpin general soil map unit.

The erosion hazard, equipment limitation, seedling mortality, and plant competition are management concerns. These soils are also suited to habitat for woodland wildlife.

Except for some of the sloping and moderately steep soils of minor extent on foot slopes, these soils are generally not suited to urban use. Slope is the main limitation.

3. Shelocta-Grigsby-Stokly

Deep and very deep, well drained and somewhat poorly drained, nearly level to moderately steep soils that have a loamy subsoil; on foot slopes, colluvial fans, and flood plains

This map unit is on foot slopes and on colluvial fans and flood plains along the major tributaries of the Levisa Fork of the Big Sandy River in Johnson County. It consists of long, winding, narrow flood plains dissected by many small foot slopes and colluvial fans. Slopes range from 0 to 15 percent.

This map unit makes up about 4 percent of Johnson County. It is about 45 percent Shelocta soils, 41 percent Grigsby soils, 11 percent Stokly soils, and 3 percent soils of minor extent.

Shelocta soils are deep and very deep and well drained. They are on foot slopes and colluvial fans. They formed in mixed colluvium derived from shale, siltstone, and sandstone. Typically, the surface layer is yellowish brown loam. The subsoil is yellowish brown and brownish yellow loam in the upper part, yellowish brown channery silt loam in the middle part, and yellowish brown, mottled channery loam in the lower part. The substratum is light olive brown, mottled very channery loam.

Grigsby soils are very deep and well drained. They are on flood plains. They formed in mixed alluvium derived from sandstone, siltstone, and shale. Typically, the surface layer is dark yellowish brown fine sandy loam. The subsoil is dark yellowish brown and yellowish brown fine sandy loam. The substratum is dark yellowish brown, stratified sandy loam and fine sandy loam.

Stokly soils are very deep and somewhat poorly drained. They are on flood plains. They formed in mixed alluvium derived from sandstone, siltstone, and shale. Typically, the surface layer is dark brown fine sandy loam. The subsoil is dark brown, mottled fine sandy loam in the upper part, light brownish gray, mottled fine sandy loam in the middle part, and mottled light brownish gray and brown fine sandy loam in the lower part. The substratum is light brownish gray and light yellowish brown fine sandy loam in the upper part and light brownish gray, mottled sandy loam in the lower part.

Of minor extent in this map unit are Allegheny and Knowlton soils on stream terraces.

The soils of this map unit are used mainly for cultivated crops, hay, and pasture. Some areas are used for residential and commercial sites.

The nearly level Grigsby soils and drained areas of the Stokly soils are well suited to cultivated crops. The sloping and moderately steep Shelocta soils are better suited to hay, pasture, or woodland. The main limitations are slope, the erosion hazard, and flooding in low areas.

The soils in this map unit are well suited to woodland. Plant competition is a management concern. Most of the soils in this map unit are suited to habitat for openland wildlife.

The soils in this map unit are suited to some urban uses. Flooding is a limitation on Grigsby and Stokly soils and slope is a limitation on Shelocta soils. The seasonal high water table is also a limitation on Stokly soils.

4. Udorthents-Allegheny-Nelse

Very deep, gently sloping to steep, well drained soils that have underlying layers of loamy material or that have a loamy subsoil; in reconstructed valleys and on stream terraces, colluvial fans, and streambanks

This map unit is in broad valleys along the Levisa Fork of the Big Sandy River in Johnson County. The landscape consists of long, winding, gently sloping stream terraces breaking to short, gently sloping to steep, alluvial side slopes along the riverbanks. Slopes range from 0 to 25 percent, but short, steeper areas are along the upper edge of riverbanks. Paintsville is located on this map unit.

This map unit makes up about 3 percent of Johnson County. It is about 44 percent Udorthents, 18 percent Allegheny soils, 16 percent Nelse soils, and 22 percent soils of minor extent.

Udorthents are very deep and well drained. They are in reconstructed valleys. About 20 percent of Udorthents are in built-up, urban areas. These soils formed in mixed soil and rock material brought in from areas of road construction. The properties of Udorthents are well varied.

Allegheny soils are very deep and well drained. They are on stream terraces and alluvial fans. They formed in mixed alluvium from sandstone, siltstone, and shale. Typically, the surface layer is dark yellowish brown loam. The subsoil is yellowish brown loam in the upper part, yellowish brown mottled loam and fine sandy loam in the middle part, and yellowish brown fine sandy loam in the lower part. The substratum is yellowish brown mottled sandy loam.

Nelse soils are very deep and well drained. They

are on riverbanks. They formed in sandy alluvium. Typically, the surface layer consists of dark brown loam and strata of loamy fine sand. In the upper part the underlying material is brown and dark brown fine sandy loam that has sand bedding planes. In the lower part it is dark grayish brown and dark brown loamy fine sand that has sand bedding planes.

Of minor extent in this map unit are Grigsby soils on flood plains and Cotaco, Chavies, and Knowlton soils on stream terraces.

The soils of this map unit are used mainly for residential and commercial development. Some areas are used for cultivated crops, hay, and pasture. Small tracts of woodland are in wet areas and on steep riverbanks.

The nearly level and gently sloping areas of Allegheny soils are well suited to cultivated crops. The soils in the more sloping areas are best suited to hay, pasture, or woodland. The main limitations are slope, the erosion hazard, and flooding in low areas.

Nelse and Allegheny soils are well suited to woodland. On Nelse soils, the equipment limitation, seedling mortality, and plant competition are management concerns. These soils are suited to habitat for openland wildlife.

These soils are moderately well suited to some urban uses. Flooding is a limitation. In the steeper areas of Nelse and Allegheny soils slope is a limitation. Udorthents are contrasting and variable in this map unit. They are subject to irregular settling. Because of Udorthents, onsite investigation is needed to determine the suitability and limitations for any proposed use of this map unit.

Detailed Soil Map Units

The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading "Use and Management of the Soils." For example, the section "Woodland Management and Productivity" and table 7 give specific information about potential productivity for trees on each map unit.

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic class of the dominant soils or miscellaneous areas. A taxonomic class precisely defines limits for the properties of soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms, or segments of landforms, that have similar requirements for use and management. The delineation of such segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils are rated as to their suitability. They are divided into four groups: well suited, moderately well suited, poorly suited, and generally not suited.

Soils well suited have favorable properties for the specified use and limitations are easy to overcome. Good performance and low maintenance can be expected.

Soils moderately well suited have moderately favorable properties for the selected use. One or more properties make these soils less desirable than well suited soils.

Soils poorly suited have one or more properties unfavorable for the selected use. Overcoming the limitations require special designs, extra maintenance, or costly operation.

Soils generally not suited do not meet the expected performance for the selected use or extreme measures are needed to overcome the undesirable features.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major

horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Allegheny loam, 2 to 6 percent, rarely flooded, is a phase of the Allegheny series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Dekalb-Gilpin-Marrowbone complex, 20 to 80 percent slopes, very stony, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Dumps, coal, is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Tables" under "Contents") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

AbB—Allegheny loam, 2 to 6 percent slopes, rarely flooded

This is a very deep, gently sloping, well drained soil on stream terraces and alluvial fans. It is along the Levisa Fork of the Big Sandy River. Slopes are convex. Areas are long and narrow and about 5 to 25 acres.

Typically, the surface layer is dark yellowish brown loam about 8 inches thick. The subsoil extends to a depth of 72 inches. In the upper part, to a depth of 15 inches, it is yellowish brown loam. In the middle part, to a depth of 42 inches, it is yellowish brown, mottled loam and fine sandy loam. In the lower part it is yellowish brown fine sandy loam. The substratum to a depth of 89 inches is yellowish brown, mottled sandy loam.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The available water capacity is high. The root zone is very deep. Tilth is good. The soil is subject to rare flooding.

Included with this Allegheny soil in mapping are small areas of Cotaco and Chavies soils. The included soils make up about 10 percent of this map unit. Individual areas are generally less than 2 acres.

This Allegheny soil is used mainly for cropland, hay, and pasture. Many areas are used for home sites, gardens, and urban development (fig. 8).

This soil is well suited to cultivated crops. Corn and tobacco are common. The hazard of erosion is moderate if conventional tillage is used. Conservation tillage, crop residue returned to the surface, cover crops, and crop rotation with grasses and legumes help to control erosion and to maintain desirable soil structure, good tilth, and the content of organic matter.

This soil is well suited to hay and pasture. Improved varieties of grasses and legumes are needed to produce high quality hay and forage and to provide good ground cover. Grazing before the plants are well established, overgrazing, or grazing when the soil is wet damages plants. The resulting thin ground cover can increase weed competition and can require early renovation. A well planned harvesting and clipping schedule is important in producing high yields.

This soil is well suited to woodland, but few areas are used for timber production. Shortleaf pine, yellow-poplar, Virginia pine, sugar maple, white ash, northern red oak, American elm, red maple, pignut hickory, black oak, white oak, eastern redcedar, and black cherry are native. Eastern white pine, yellow-poplar, black walnut, shortleaf pine, white oak, white ash, and northern red oak are preferred for planting. Plant competition is the main management concern. It prevents adequate natural or artificial reforestation unless intensive site preparation and maintenance are used.

This soil is moderately well suited to some urban uses. Flooding is a limitation for most building site development and for sanitary facilities.

This soil is in capability subclass IIe.

AeB—Allegheny loam, 2 to 6 percent slopes, occasionally flooded

This is a very deep, gently sloping, well drained soil on stream terraces and alluvial fans. It is along the tributaries of the Levisa Fork of the Big Sandy River. Slopes are convex. Areas are irregular and about 5 to 25 acres.

Typically, the surface layer is dark yellowish brown loam about 8 inches thick. The subsoil extends to a depth of 72 inches. In the upper part, to a depth of 15 inches, it is yellowish brown loam. In the middle part, to a depth of 42 inches, it is yellowish brown, mottled

Figure 8.—The higher stream terraces are used as home sites. The soil is Allegheny loam, 2 to 6 percent slopes, rarely flooded.

loam and fine sandy loam. In the lower part it is yellowish brown fine sandy loam. The substratum to a depth of 89 inches is yellowish brown, mottled sandy loam.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The available water capacity is high. The root zone is very deep. Tilth is good. The soil is subject to occasional flooding.

Included with this Allegheny soil in mapping are small areas of Cotaco and Chavies soils. Included soils make up about 10 percent of this map unit. Individual areas are generally less than 2 acres.

This Allegheny soil is used mainly for cropland, hay, and pasture. Many areas are used as sites for houses, gardens, and urban development.

This soil is well suited to cultivated crops. Corn and tobacco are common. The hazard of erosion is moderate if conventional tillage is used. Conservation tillage, crop residue returned to the surface, cover crops, and crop rotation with grasses and legumes help to control erosion and to maintain desirable soil structure, good tilth, and the content of organic matter.

This soil is well suited to hay and pasture. Improved varieties of grasses and legumes will produce high quality hay and forage and will provide good ground cover. Grazing before the plants are well established, overgrazing, or grazing when the soil is wet damages plants. The resulting thin ground cover can increase weed competition and can require early renovation. A well planned harvesting and clipping schedule is important in producing high yields.

This soil is well suited to woodland, but few areas are used for timber production. Shortleaf pine, yellow-poplar, Virginia pine, sugar maple, white ash, northern red oak, American elm, red maple, pignut hickory,

black oak, eastern redcedar, and black cherry are native. Eastern white pine, yellow-poplar, black walnut, shortleaf pine, white oak, white ash, and northern red oak are preferred for planting. Plant competition is the main management concern. It prevents adequate natural or artificial reforestation unless intensive site preparation and maintenance are used.

This soil is poorly suited to most urban uses because of flooding.

This Allegheny soil is in capability subclass IIe.

AeC—Allegheny loam, 6 to 15 percent slopes, occasionally flooded

This is a very deep, sloping and moderately steep, well drained soil on stream terraces and alluvial fans. It is along the Levisa Fork of the Big Sandy River. Slopes are convex. Areas are narrow bands and are about 5 to 15 acres.

Typically, the surface layer is dark yellowish brown loam about 8 inches thick. The subsoil extends to a depth of 72 inches. In the upper part, to a depth of 15 inches, it is yellowish brown loam. In the middle part, to a depth of 42 inches, it is yellowish brown, mottled loam and fine sandy loam. In the lower part it is yellowish brown fine sandy loam. The substratum to a depth of 89 inches is yellowish brown, mottled sandy loam.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The available water capacity is high. The root zone is very deep. Tilth is good. This soil is subject to occasional flooding.

Included with this Allegheny soil in mapping are small areas of Chavies and Cotaco soils. Also included are areas of Allegheny soils that have slopes of less than 6 percent or more than 15 percent. Included soils make up about 15 percent of this map unit. Individual areas are generally less than 2 acres.

This Allegheny soil is used mainly for pasture and hay. In some small areas it is used for cropland.

This soil is suited to cultivated crops. The hazard of erosion is severe if conventional tillage is used. Conservation tillage, returning crop residue to the surface, cover crops, and crop rotation with grasses and legumes help to control erosion and to maintain desirable soil structure, good tilth, and the content of organic matter.

This soil is well suited to hay and pasture. Improved varieties of grasses and legumes are needed to produce high quality hay and forage and to provide good ground cover. Grazing before the plants are well established, overgrazing, or grazing when the soil is wet damages plants. The resulting thin ground cover increases weed competition and the need for early renovation. A well planned harvesting and clipping schedule is important in producing high yields.

This soil is well suited to woodland, but few areas are used for timber production. Shortleaf pine, yellow-poplar, Virginia pine, sugar maple, white ash, northern red oak, American elm, red maple, pignut hickory, black oak, white oak, eastern redcedar, and black cherry are native. Eastern white pine, yellow-poplar, black walnut, shortleaf pine, white oak, white ash, and northern red oak are preferred for planting. Plant competition is the main management concern. It prevents adequate natural or artificial reforestation unless intensive site preparation is used.

This soil is poorly suited for most urban uses because of flooding. Slope is also a limitation.

This Allegheny soil is in capability subclass IIIe.

ChB—Chavies fine sandy loam, 2 to 6 percent slopes, rarely flooded

This is a very deep, gently sloping, well drained soil on stream terraces. It is along the Levisa Fork of the Big Sandy River and its tributaries. Slopes are convex. Areas are narrow bands about 5 to 25 acres in size.

Typically, the surface layer is dark brown fine sandy loam about 10 inches thick. The subsoil extends to a depth of 64 inches. In the upper part, to a depth of 29 inches, it is dark yellowish brown fine sandy loam. In the lower part it is yellowish brown, mottled fine sandy loam and sandy loam.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid. The available water capacity is moderate. The root zone is very deep. Tilth is good. This soil is subject to rare flooding.

Included with this Chavies soil in mapping are small areas of Cotaco and Allegheny soils. Also included are some areas of Chavies soil that have slopes greater than 6 percent. Included soils make up about 10 percent of this map unit. Individual areas are generally less than 2 acres.

This Chavies soil is used mainly for cropland, hay, and pasture. Many areas are used for home sites, gardens, and urban development.

This soil is well suited to cultivated crops. Corn and tobacco are common. The hazard of erosion is moderate if conventional tillage is used. Conservation tillage, crop residue returned to the surface, cover crops, and crop rotation with grasses and legumes help to control erosion and to maintain desirable soil structure, good tilth, and the content of organic matter.

This soil is well suited to hay and pasture. Improved

varieties of grasses and legumes are needed to produce high quality hay and forage and to provide good ground cover. Grazing before plants are well established, overgrazing, or grazing when the soil is wet damages plants. The resulting thin ground cover increases weed competition and the need for early renovation. A well planned harvesting and clipping schedule is important in producing high yields.

This soil is well suited to woodland, but few areas are used for timber production. Shortleaf pine, northern red oak, yellow-poplar, black walnut, black cherry, sugar maple, red maple, hickory, white oak, and American sycamore are native. Eastern white pine, yellow-poplar, black walnut, northern red oak, white oak, and shortleaf pine are preferred for planting. Plant competition is the main management concern. It prevents adequate natural or artificial reforestation unless intensive site preparation and maintenance are used.

This soil is moderately well suited to some urban uses. Flooding is a limitation for most building site development and for sanitary facilities.

This Chavies soil is in capability subclass IIe.

Co—Cotaco loam, rarely flooded

This is a very deep, nearly level and gently sloping, moderately well drained or somewhat poorly drained soil on stream terraces. It is along the Levisa Fork of the Big Sandy River. Slopes are smooth and slightly concave and range from 0 to 4 percent. Areas are narrow bands about 5 to 20 acres in size.

Typically, the surface layer is dark brown loam about 6 inches thick. The subsoil extends to a depth of 31 inches. In the upper part, to a depth of 18 inches, it is dark brown and brown, mottled loam. In the lower part it is mottled grayish brown and strong brown loam. The substratum to a depth of 62 inches is mottled light brownish gray and strong brown loam.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. Available water capacity is high. Tilth is good, but wetness reduces the optimum moisture range for cultivation. This soil is saturated in late winter and early spring by a seasonal high water table within 1.5 to 2.5 feet of the surface. The root zone is very deep. This soil is subject to rare flooding.

Included with this Cotaco soil in mapping are small areas of Allegheny, Chavies, and Knowlton soils. Included soils make up about 10 percent of this map unit. Individual areas are generally less than 2 acres.

This Cotaco soil is used mainly for hay and pasture. Many areas are used for home sites, gardens, and urban development.

Drained areas of this soil are suited to most cultivated crops. Conservation tillage, crop residue returned to the surface, cover crops, and crop rotation with grasses and legumes help to control erosion and to maintain desirable soil structure, good tilth, and the content of organic matter.

This soil is well suited to pasture and hay crops that tolerate some wetness. Improved varieties of grasses and legumes are needed to produce high quality hay and forage and to provide good ground cover. Grazing before the plants are well established, overgrazing, or grazing when the soil is wet damages plants. The resulting thin ground cover can increase weed competition and can require early renovation. A well planned harvesting and clipping schedule is important in producing high yields.

This soil is well suited to woodland, but few areas are used for timber production. Virginia pine, white oak, American beech, black oak, and yellow-poplar are native. White oak, eastern white pine, yellow-poplar, sweetgum, and shortleaf pine are preferred for planting. Plant competition is the main management concern. It prevents adequate natural or artificial reforestation unless intensive site preparation and maintenance are used.

This soil is moderately well suited to some urban uses. Flooding and the seasonal high water table are limitations for most building site development and for sanitary facilities.

This Cotaco soil is in capability subclass IIw.

DgF—Dekalb-Gilpin-Marrowbone complex, 20 to 80 percent slopes, very stony

This complex consists of moderately deep, steep and very steep, well drained soils on upper mountainsides, crests, saddles, and noses. The Dekalb soil is on both convex and linear, upper mountainsides, noses, and crests. The Gilpin soil is on convex, upper mountainsides, noses, crests, and saddles. The Marrowbone soil is on both convex and linear, upper mountainsides, noses, and crests. These soils are too intricately mixed to be separated at the scale selected for mapping. They are in a repeating pattern on the landscape. Stones and rock outcrops cover about 3 percent of the surface. Areas are about 5 to 1,200 acres.

The Dekalb soil makes up about 30 percent of this complex, the Gilpin soil 20 percent, the Marrowbone soil 15 percent, and included soils 35 percent.

Typically, the surface layer of the Dekalb soil is very dark grayish brown sandy loam about 2 inches thick. The subsurface layer to a depth of 6 inches is light

yellowish brown channery sandy loam. The subsoil extends to a depth of 27 inches. In the upper part, to a depth of 14 inches, it is brownish yellow channery fine sandy loam. In the lower part it is brownish yellow very channery and extremely channery sandy loam. It overlies gray sandstone.

The Dekalb soil is low in natural fertility and organic matter content. Permeability is moderately rapid or rapid. Available water capacity is low. The root zone is moderately deep. Root penetration is limited by rock fragments. Depth to bedrock ranges from 20 to 40 inches.

Typically, the surface layer of the Gilpin soil is brown loam about 5 inches thick. The subsoil, to a depth of 18 inches, is yellowish brown loam that is mottled in the lower part. The substratum to a depth of 28 inches is yellowish brown very channery loam. It overlies interbedded shale and siltstone.

The Gilpin soil is low in natural fertility and low or moderate in organic matter content. Permeability is moderate. Available water capacity is moderate. The root zone is moderately deep. Depth to bedrock ranges from 20 to 40 inches.

Typically, the surface layer of the Marrowbone soil is dark brown fine sandy loam about 7 inches thick. The subsoil extends to a depth of 32 inches. In the upper part, to a depth of 27 inches, it is yellowish brown, brownish yellow, and strong brown fine sandy loam. In the lower part it is brownish yellow fine sandy loam. The substratum to a depth of 37 inches is strong brown very channery fine sandy loam. It overlies gray sandstone.

The Marrowbone soil is low in natural fertility and organic matter content. Permeability is moderate or moderately rapid. Available water capacity is moderate. The root zone is moderately deep. Depth to bedrock ranges from 20 to 40 inches.

Included with this complex in mapping are small areas of Fedscreek, Hazleton, and Rigley soils. Also included are moderately deep soils that are more clayey throughout than typical for the Gilpin soil. Small areas of rock outcrop are on crests, noses, and upper side slopes. Included soils and rock outcrop make up about 35 percent of this map unit. Individual areas of these soils or rock outcrop are generally less than 10 acres.

The Dekalb, Gilpin, and Marrowbone soils in this complex are used mainly for woodland.

These soils are generally not suited to cultivated crops, hay, or pasture. Slope, the hazard of erosion, depth to bedrock, stones on the surface, and rock outcrops are limitations.

These soils are moderately well suited to woodland. Black oak, hickory, shortleaf pine, white oak, red maple, post oak, scarlet oak, chestnut oak, and Virginia pine are native on warm aspects. Black oak, white oak, hickory, American beech, yellow-poplar, scarlet oak, black oak, white oak, chestnut oak, shortleaf pine, and Virginia pine are native on cool aspects. Shortleaf pine and white oak are preferred for planting on warm aspects. Eastern white pine, shortleaf pine, yellow-poplar, white oak, and northern red oak are preferred for planting on cool aspects. On cool aspects understory plants include flowering dogwood, sugar maple, sawbrier, American beech, black gum, sassafras, Virginia pine, and Christmas fern. On warm aspects they are red maple, sourwood, lowbush blueberry, black gum, hickory, sassafras, chestnut oak, flowering dogwood, and sawbrier.

The concerns in managing timber on these soils are the erosion hazard, equipment limitation, seedling mortality, and plant competition. Steep skid trails and roads are subject to rilling and gullying unless protected by adequate water bars, plant cover, or both. Slope restricts the use of wheeled and tracked equipment on skid trails. Cable skidding generally is safer and disturbs less soil. On warm aspects seedling mortality generally is severe in summer because of high temperatures and inadequate moisture in the soil. Careful management of reforestation after harvesting helps to reduce undesirable plant competition.

These soils are generally not suited to urban use. Slope is the main limitation.

The Dekalb, Gilpin, and Marrowbone soils are in capability subclass VIIe.

Dm—Dumps, coal

This map unit consists of coal stockpiles and coal refuse dumps scattered throughout the survey area. Areas are about 3 to 60 acres and vary in shape. Typically, the stockpiles and dumps are level to very steep and include coal processing plants, coal tipples, railways, or areas that have been filled with coal waste material (fig. 9). Most areas are incapable of supporting plant life without major reclamation.

Included in and making up about 25 percent of this map unit are small areas of Bethesda, Fairpoint, and Myra soils. Individual areas generally are less than 2 acres.

Dumps, coal, is in capability subclass VIIIs.

FbB—Fairpoint-Bethesda complex, 0 to 6 percent slopes

This complex consists of very deep, nearly level and gently sloping, well drained soils on ridgetops and

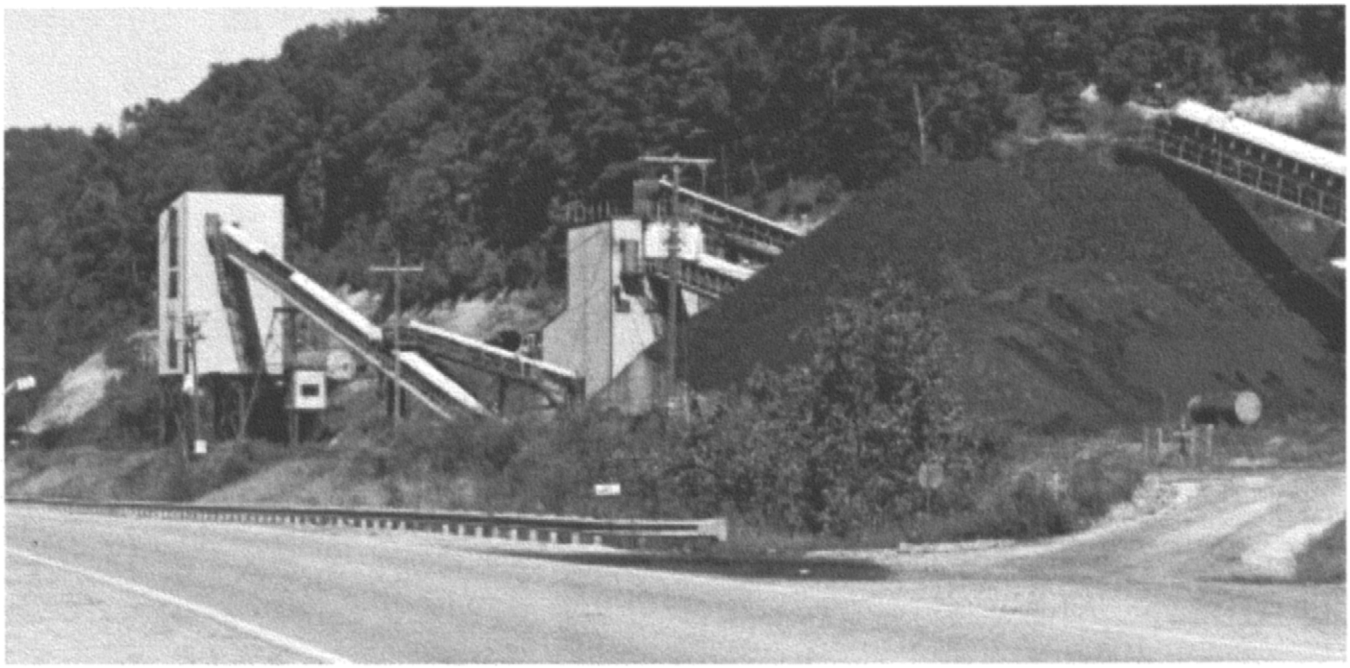


Figure 9.—Coal tipple in an area of Dumps, coal, in Floyd County.

benches. These soils formed in reshaped soil material from surface coal mining. They are too intricately mixed to be separated at the scale selected for mapping. Areas are irregularly shaped and range from about 5 to 200 acres.

The Fairpoint soil makes up about 45 percent of this complex, the Bethesda soil 30 percent, and included soils 25 percent.

Typically, the surface layer of the Fairpoint soil is brownish yellow channery loam about 4 inches thick. The underlying material extends to a depth of 62 inches. In the upper part, to a depth of 36 inches, it is mottled brownish yellow, light brownish gray, and grayish brown very channery loam. In the lower part it is dark grayish brown extremely channery silt loam.

The Fairpoint soil is low in natural fertility and organic matter content. Permeability is moderately slow. Available water capacity is low. The root zone is very deep, but root penetration is restricted by rock fragments and compaction.

Typically, the surface layer of the Bethesda soil is yellowish brown channery loam about 5 inches thick. The underlying material extends to a depth of 62 inches. In the upper part, to a depth of 27 inches, it is dark brown, mottled very channery loam. In the lower part it is dark grayish brown extremely channery loam.

The Bethesda soil is low in natural fertility and organic matter content. Permeability is moderately slow. Available water capacity is low. The root zone is very deep, but root penetration is restricted by rock fragments and compaction.

These soils are vary in their characteristics. Onsite investigation is required to determine the suitability of a specific area for a particular use.

Included with this complex in mapping are small areas of Dekalb, Fedscreek, Gilpin, Myra, and Marrowbone soils, areas where slopes are greater than 6 percent, and some severely eroded and gullied areas. Included soils make up about 25 percent of the map unit. Individual areas are generally less than 5 acres.

The Fairpoint and Bethesda soils in this complex are mainly reclaimed idle land. Most areas have been revegetated to tall fescue and sericea lespedeza. Some areas are used for pasture, woodland, and building sites.

These soils are generally not suited to cultivated crops.

These soils are moderately well suited to pasture and hay, but grasses and legumes are difficult to establish. Rock fragments and large stones restrict the use of equipment. Differential settlement is a hazard in places. A fast-growing, protective, and permanent cover is needed. Before seeding the area, smoothing the spoil eliminates interference to use of equipment in planting and harvesting.

These soils are moderately well suited to woodland. Some areas have been revegetated to loblolly pine, sweetgum, black oak, black locust, and yellow-poplar.

Eastern white pine, black locust, white oak, and shortleaf pine are preferred for planting.

The concerns in managing timber on these soils are the erosion hazard, equipment limitation, seedling mortality, and plant competition. Difficulty in establishing adequate ground cover increases the hazard of erosion. Rock fragments and large stones restrict the use of equipment. Soil compaction and large amounts of rock fragments can reduce seedling survival. Plant competition can be severe in areas where tall fescue or sericea lespedeza is established.

If these soils are graded, reseeded, and planted to herbaceous or woody plants, they can provide food and cover for wildlife. Any planting that provides food and enough cover to control soil erosion is beneficial to wildlife.

These soils are poorly suited to urban uses. Stones, differential settling potential, and moderately slow permeability are limitations.

The Fairpoint and Bethesda soils are in capability subclass VIs.

FbD—Fairpoint-Bethesda complex, 6 to 30 percent slopes

This complex consists of very deep, sloping to steep, well drained soils on ridgetops and benches. They formed in reshaped material from surface coal mining. These soils are too intricately mixed to be separated at the scale selected for mapping. Areas are irregularly shaped and range from about 5 to 100 acres.

The Fairpoint soil makes up about 45 percent of this complex, the Bethesda soil 30 percent, and included soils 25 percent.

Typically, the surface layer of the Fairpoint soil is brownish yellow channery loam about 4 inches thick. The underlying material extends to a depth of 62 inches. In the upper part, to a depth of 36 inches, it is mottled, brownish yellow, light brownish gray, and grayish brown very channery loam. In the lower part it is dark grayish brown extremely channery silt loam.

The Fairpoint soil is low in natural fertility and organic matter content. Permeability is moderately slow. Available water capacity is low. The root zone is very deep, but root penetration is restricted by rock fragments and compaction.

Typically, the surface layer of the Bethesda soil is yellowish brown channery loam about 5 inches thick. The underlying material extends to a depth of 62 inches. In the upper part, to a depth of 27 inches, it is dark brown, mottled very channery loam. In the lower part it is dark grayish brown extremely channery loam.

The Bethesda soil is low in natural fertility and organic matter content. Permeability is moderately slow. Available water capacity is low. The root zone is very deep, but root penetration is restricted by rock fragments and compaction.

These soils vary in their characteristics. Onsite investigation is required to determine the suitability of a specific area for a particular use.

Included with this complex in mapping are small areas of Dekalb, Fedscreek, Gilpin, and Marrowbone soils and some severely eroded and gullied areas. Included soils make up about 25 percent of this map unit. Individual areas are generally less than 5 acres.

The Fairpoint and Bethesda soils in this complex consist mainly of reclaimed idle land. Most areas have been revegetated to tall fescue and sericea lespedeza. Some areas are used for pasture, woodland, and building sites.

These soils generally are not suited to cultivated crops.

These soils are moderately well suited to pasture and hay, but grasses and legumes are difficult to establish. Rock fragments and large stones restrict the use of equipment. Differential settlement is a hazard in places. A fast-growing, protective, permanent cover is needed. Before seeding the area, smoothing the spoil allows use of equipment in planting and harvesting.

These soils are moderately well suited to woodland. Some areas have been revegetated to loblolly pine, sweetgum, black oak, black locust, and yellow-poplar. Eastern white pine, black locust, shortleaf pine, and white oak are preferred for planting.

The concerns in managing timber on these soils are the erosion hazard, the equipment limitation, seedling mortality, and plant competition. In the steeper areas erosion is a hazard and equipment use is limited. Soil compaction and large amounts of rock fragments can reduce seedling survival. Plant competition can be severe in areas where tall fescue or sericea lespedeza is established.

If these soil are graded, reseeded, and planted to herbaceous or woody plants, they are a potential source of food and cover for wildlife. Any planting that provides food and enough cover to control soil erosion is beneficial to wildlife.

These soils are generally not suited to urban uses. Slope, stones, differential settlement potential, moderately slow permeability, and slippage are limitations.

The Fairpoint and Bethesda soils are in capability subclass VIs.

FbF—Fairpoint-Bethesda complex, 30 to 70 percent slopes, stony

This complex consists of very deep, very steep, well drained soils on mountainsides. They formed in reshaped material from surface coal mining. These soils are too intricately mixed to be separated at the scale selected for mapping. Areas are irregularly shaped and range from about 5 to 300 acres.

The Fairpoint soil makes up about 60 percent of this complex, the Bethesda soil 15 percent, and included soils 25 percent.

Typically, the surface layer of the Fairpoint soil is brownish yellow channery loam about 4 inches thick. The underlying material extends to a depth of 62 inches. In the upper part, to a depth of 36 inches, it is mottled brownish yellow, light brownish gray, and grayish brown very channery loam. In the lower part it is dark grayish brown extremely channery silt loam.

The Fairpoint soil is low in natural fertility and organic matter content. Permeability is moderately slow and the available water capacity is low. The root zone is very deep, but root penetration is restricted by rock fragments and compaction.

Typically, the surface layer of the Bethesda soil is yellowish brown channery loam about 5 inches thick. The underlying material extends to a depth of 62 inches. In the upper part, to a depth of 27 inches, it is dark brown, mottled very channery loam. In the lower part it is dark grayish brown extremely channery loam.

The Bethesda soil is low in natural fertility and organic matter content. Permeability is moderately slow. Available water capacity is low. The root zone is very deep, but root penetration is restricted by rock fragments and compaction.

These soils vary in their characteristics. Onsite investigation is required to accurately determine the suitability of a specific area for a particular use.

Included with this complex in mapping are small areas of Dekalb, Fedscreek, Gilpin, Hazleton, Kimper, Marrowbone, and Shelocta soils. Also included are some areas that have slopes greater than 70 percent and some severely eroded and gullied areas. Included soils make up about 25 percent of this map unit. Individual areas are generally less than 5 acres.

The Fairpoint and Bethesda soils in this complex are mainly reclaimed idle land. Most areas have been revegetated to tall fescue and sericea lespedeza. Some areas are used for pasture and woodland.

These soils are generally not suited to cultivated crops, hay, or pasture. The steep outslopes, created by the removal of soil, parent material, and coal, commonly are unstable and are subject to slides. Differential settling is a hazard in places. A fast-growing, protective, permanent plant cover is needed.

These soils are moderately well suited to woodland. Some areas have been revegetated to loblolly pine, sweetgum, black oak, black locust, and yellow-poplar. Eastern white pine, black locust, shortleaf pine, and white oak are preferred for planting.

The concerns in managing timber on these soils are the erosion hazard, the equipment limitation, seedling mortality, and plant competition. Erosion is a severe hazard. Equipment use is severely limited by slope. Soil compaction and large amounts of rock fragments can reduce seedling survival. Seedling mortality can be severe in areas where tall fescue or sericea lespedeza has been established.

These soils provide a limited source of food and cover for wildlife. Plantings should consist of herbaceous plants, trees, and shrubs. Any planting that provides food and enough cover to control soil erosion is beneficial to wildlife.

These soils are generally not suited to most urban uses. Slope, stones, moderately slow permeability, differential settlement potential, and slippage are limitations.

The Fairpoint and Bethesda soils are in capability subclass VIIe.

FsF—Fedscreek-Shelocta complex, 20 to 50 percent slopes

This complex consists of deep and very deep, steep and very steep, well drained soils on foothills along major streams. The Fedscreek soil is on crests, on upper, middle, and lower side slopes, and in coves. The Shelocta soil is on convex lower side slopes and on foot slopes. These soils are too intricately mixed to be separated at the scale selected for mapping. They occur in a repeating pattern on the landscape. Areas are about 5 to 200 acres.

The Fedscreek soil makes up about 40 percent of this complex, the Shelocta soil 35 percent, and included soils 25 percent.

Typically, the surface layer of the Fedscreek soil is brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of 63 inches. It is yellowish brown loam to a depth of 12 inches. To a depth of 36 inches it is strong brown loam and channery loam that is mottled in the lower part. It is strong brown and yellowish brown very channery fine sandy loam to a depth of 63 inches. It overlies fractured sandstone, siltstone, and shale.

The Fedscreek soil is medium in natural fertility and moderate in organic matter content. Permeability is

moderately rapid in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is moderate. The root zone is deep and very deep.

Typically, the surface layer of the Shelocta soil is yellowish brown loam about 7 inches thick. The subsoil extends to a depth of 47 inches. In the upper part, to a depth of 24 inches, it is yellowish brown and brownish yellow loam. In the middle part, to a depth of 38 inches, it is yellowish brown channery silt loam. In the lower part it is yellowish brown, mottled channery loam. The substratum to a depth of 62 inches is light olive brown, mottled very channery loam.

The Shelocta soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. Available water capacity is high. The root zone is deep and very deep.

Included with this complex in mapping are small areas of Gilpin, Marrowbone, and Dekalb soils on upper side slopes and crests. The included soils make up about 25 percent of this map unit. Individual areas are generally less than 5 acres.

The Fedscreek and Shelocta soils in this complex are used mainly for woodland and pasture. Some areas are used for home sites.

The soils in this complex generally are not suited to cultivated crops. Slope is a limitation.

In the less sloping areas, these soils are suited to pasture. Grasses and legumes that produce high quality forage, provide good ground cover, and require the least amount of renovation should be selected. Overgrazing reduces the stand of desirable plants and can cause erosion.

These soils are moderately well suited to woodland. White oak, black oak, American beech, pignut hickory, yellow-poplar, Virginia pine, scarlet oak, hickory, black gum, red maple and chestnut oak are native on warm aspects. White oak, yellow-poplar, black gum, black oak, scarlet oak, chestnut oak, American basswood, black walnut, American beech, red maple, shortleaf pine, and cucumbertree are native on cool aspects. Shortleaf pine, white oak, and eastern white pine are preferred for planting on warm aspects. Yellow-poplar, northern red oak, black walnut, white oak, eastern white pine, white ash, and shortleaf pine are preferred for planting on cool aspects. Understory plants include sawbrier, sedum, Christmas fern, flowering dogwood, galax, wild grape, lowbush blueberry, pussytoes, and sassafras.

The concerns in managing timber on these soils are the erosion hazard, the equipment limitation, seedling mortality, and plant competition. Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, plant cover, or both. Slope restricts the use of wheeled and tracked equipment on skid trails. Cable skidding generally is safer and disturbs the soil less. On warm aspects, seedling mortality generally is moderate in summer because of high temperatures and inadequate moisture in the soils. Reforestation after harvesting must also be managed carefully to reduce plant competition.

These soils are poorly suited to urban uses because of slope. Some areas on crests and lower side slopes are less sloping and are suited to urban uses.

The Fedscreek and Shelocta soils are in capability subclass VIIe.

GfF—Gilpin-Fedscreek-Marrowbone complex, 20 to 60 percent slopes

This complex consists of moderately deep to very deep, steep and very steep, well drained soils on upper mountainsides, noses, crests, and saddles. The Gilpin and Marrowbone soils are on both convex and linear, upper mountainsides, crests, saddles, and noses. The Fedscreek soil is on concave, upper mountainsides and benches. These soils are too intricately mixed to be separated at the scale selected for mapping. They are in a repeating pattern on the landscape. Areas are about 5 to 1,200 acres.

The Gilpin soil makes up about 40 percent of this complex, the Fedscreek soil 20 percent, the Marrowbone soil 15 percent, and included soils 25 percent.

Typically, the surface layer of the Gilpin soil is brown loam about 5 inches thick. The subsoil to a depth of 18 inches is yellowish brown loam that is mottled in the lower part. The substratum to a depth of 28 inches is mottled yellowish brown very channery loam. It overlies interbedded shale and siltstone.

The Gilpin soil is low in natural fertility and low or moderate in organic matter content. Permeability is moderate. Available water capacity is moderate. The root zone is moderately deep. Depth to bedrock ranges from 20 to 40 inches.

Typically, the surface layer of the Fedscreek soil is brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of 63 inches. It is yellowish brown loam to a depth of 12 inches. To a depth of 36 inches, it is strong brown loam and channery loam that is mottled in the lower part. It is strong brown and yellowish brown very channery fine sandy loam to a

depth of 63 inches. It overlies fractured sandstone, siltstone, and shale.

The Fedscreek soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is moderate. The root zone is deep and very deep.

Typically, the surface layer of the Marrowbone soil is dark brown fine sandy loam about 7 inches thick. The subsoil extends to a depth of 32 inches. It is yellowish brown, brownish yellow, and strong brown fine sandy loam. In the lower part it is brownish yellow fine sandy loam. The substratum to a depth of 37 inches is strong brown very channery fine sandy loam. It overlies gray sandstone.

The Marrowbone soil is low in natural fertility and organic matter content. Permeability is moderate or moderately rapid. Available water capacity is moderate. The root zone is moderately deep. Depth to bedrock ranges from 20 to 40 inches.

Included with this complex in mapping are small areas of Dekalb soils on crests, side slopes, and noses and Rigley and Shelocta soils on side slopes. Included soils make up about 25 percent of this map unit. Individual areas are generally less than 10 acres.

The Gilpin, Fedscreek, and Marrowbone soils in this complex are used mainly for woodland.

These soils are poorly suited to cultivated crops, hay, or pasture. Slope and the erosion hazard are limitations.

These soils are moderately well suited to woodland. Black oak, white oak, scarlet oak, chestnut oak, shortleaf pine, Virginia pine, American beech, pignut hickory, yellow-poplar, red maple, and hickory are native on warm aspects. Black oak, white oak, scarlet oak, chestnut oak, shortleaf pine, Virginia pine, yellow-poplar, black gum, American basswood, black walnut, sweet birch, northern red oak, and American beech are native on cool aspects. Shortleaf pine, white oak, eastern white pine, and white oak are preferred for planting on warm aspects. Shortleaf pine, eastern white pine, northern red oak, yellow-poplar, white ash, and black walnut are preferred for planting on cool aspects. Understory plants include trefoil, tickclover, pussytoes, sedum, lousewart, American beech, flowering dogwood, redbud, mapleleaf viburnum, gall-of-the-earth, New Jersey tea, panicum, early saxifrage, azalea, greenbrier, black gum, wild grape, woodsorrel, and horsebalm.

The concerns in managing timber on these soils are the erosion hazard, the equipment limitation, seedling mortality, and plant competition. Steep skid trails and roads are subject to rilling and gullying unless protected by adequate waterbars, plant cover, or both. Slope restricts the use of wheeled and tracked equipment on skid trails. Cable skidding generally is safer and disturbs less soil. On warm aspects, seedling mortality generally is moderate in summer because of high temperatures and inadequate moisture in the soil. Reforestation after harvesting must also be managed carefully to reduce undesirable plant competition.

These soils are generally not suited to urban use. Slope is the main limitation.

The Gilpin, Fedscreek, and Marrowbone soils are in capability subclass VIIe.

Gr—Grigsby fine sandy loam, occasionally flooded

This is a very deep, nearly level and gently sloping, well drained soil. It is on flood plains along the tributaries of the Levisa Fork of the Big Sandy River. Slopes are uniform and range from 0 to 4 percent. Areas are long and narrow and about 5 to 70 acres in size.

Typically, the surface layer of the Grigsby soil is dark yellowish brown fine sandy loam about 5 inches thick. The subsoil to a depth of 42 inches is dark yellowish brown and yellowish brown fine sandy loam. The substratum to a depth of 62 inches is dark yellowish brown, stratified sandy loam and fine sandy loam.

This soil is high in natural fertility and moderate in organic matter content. Permeability is moderate or moderately rapid. Available water capacity is high. A seasonal high water table is at a depth of 3.5 to 6 feet. The root zone is very deep. Tilth is good. This soil is subject to occasional flooding.

Included with this Grigsby soil in mapping are small areas of Stokly soil and small areas along streambanks that have slopes greater than 4 percent. Also included are soils that have less sand throughout than is typical for the Grigsby soil. Included soils make up about 10 percent of this map unit. Individual areas are generally less than 2 acres.

This Grigsby soil is used mainly for cropland, hay, and pasture. Many areas are used for home sites, gardens, and urban development.

This soil is well suited to cultivated crops. Corn and tobacco are common. Conservation tillage, crop residue returned to the surface, cover crops, and crop rotation with grasses and legumes help to maintain desirable soil structure, good tilth, and the content of organic matter.

This soil is well suited to hay and pasture. Improved

varieties of grasses and legumes are needed to produce high quality hay and forage and to provide good ground cover. Grazing before the plants are well established, overgrazing, or grazing when the soil is wet damages plants. The resulting thin ground cover increases weed competition and the need for early renovation. A well planned harvesting and clipping schedule is important in producing high yields.

Surface runoff and overwash from adjacent soils in some areas can be reduced by constructing ditches near the foot of nearby hills to intercept the water. In some areas improving the stream channel reduces overflow. Drainageways should be kept open and permanently vegetated to ensure adequate surface drainage.

This soil is well suited to woodland, but few areas are used for timber production. Yellow-poplar, northern red oak, white oak, black walnut, American sycamore, sweetgum, red maple, and hickory are native. Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white oak, northern red oak, and white ash are preferred for planting. Plant competition is the main management concern. It prevents adequate natural or artificial reforestation unless intensive site preparation and maintenance are used.

This soil is poorly suited to most urban uses because of flooding.

This Grigsby soil is in capability subclass IIw.

HkF—Hazleton-Fedscreek-Kimper complex, 30 to 80 percent slopes, very stony

This complex consists of deep and very deep, very steep, well drained soils on cool aspects of middle and lower mountainsides, benches, and coves. The Hazleton soil is on concave, middle and lower mountainsides, on benches, and in coves. The Fedscreek soil is on convex and linear middle and lower mountainsides. The Kimper soil is on concave lower mountainsides, on benches, and in coves. These soils are too intricately mixed to be separated at the scale selected for mapping. They occur in a repeating pattern on the landscape. Stones cover about 2 percent of the surface. Areas are about 5 to 1,200 acres.

The Hazleton soil makes up about 30 percent of this complex, the Fedscreek soil 25 percent, the Kimper soil 25 percent, and included soils 20 percent.

Typically, the surface layer of the Hazleton soil is dark brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of 50 inches. In the upper part, to a depth of 13 inches, it is light yellowish brown channery sandy loam. In the middle part, to a depth of 28 inches, it is brownish yellow very channery sandy loam. In the lower part it is yellowish brown very flaggy fine sandy loam. The substratum to a depth of 62 inches is brownish yellow extremely channery fine sandy loam. It overlies interbedded shale, sandstone, and siltstone.

The Hazleton soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid or rapid. Available water capacity is moderate. The root zone is deep and very deep, but rock fragments restrict root penetration.

Typically, the surface layer of the Fedscreek soil is brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of 63 inches. In the upper part, to a depth of 12 inches, it is yellowish brown loam. In the middle part, to a depth of 36 inches, it is strong brown loam and channery loam that is mottled in the lower part. In the lower part it is strong brown and yellowish brown very channery fine sandy loam. It overlies fractured sandstone, siltstone, and shale.

The Fedscreek soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is moderate. The root zone is deep and very deep.

Typically, the surface layer of the Kimper soil is dark brown loam about 6 inches thick. The subsoil extends to a depth of 63 inches. In the upper part, to a depth of 19 inches, it is dark brown and yellowish brown silt loam. In the middle part, to a depth of 44 inches, it is yellowish brown channery silt loam and very channery loam. In the lower part it is yellowish brown mottled very channery loam. The substratum to a depth of 66 inches is grayish brown and strong brown very channery loam that is mottled in shades of brown, gray, and red. It overlies interbedded shale, sandstone, and siltstone.

The Kimper soil is medium in natural fertility and high in organic matter content. Permeability is moderate or moderately rapid. Available water capacity is high. The root zone is very deep.

Included with this complex in mapping are small areas of Gilpin, Dekalb, and Marrowbone soils on middle mountainsides and Shelocta soils on lower mountainsides. Included soils make up about 20 percent of this map unit, but individual areas are generally less than 10 acres.

The Hazleton, Fedscreek, and Kimper soils in this complex are used mainly for woodland.

These soils generally are not suited to cultivated crops, hay, or pasture. Slope, the hazard of erosion, and stones on the surface are limitations.

These soils are moderately well suited to woodland. Northern red oak, yellow-poplar, white oak, black oak, black locust, black gum, American basswood, black walnut, American beech, sweet birch, and sugar maple are native. Yellow-poplar, shortleaf pine, eastern white pine, northern red oak, white oak, white ash, and black walnut are preferred for planting. Understory plants include jewelweed, violets, wood nettle, black snakeroot, jack-in-the-pulpit, yellow mandarin, Christmas fern, wild geranium, waterleaf, bedstraw, bloodroot, sweet cicely, grape fern, thimbleweed, maidenhair fern, wild geranium, and Solomons seal.

The main concerns in managing timber on these soils are the erosion hazard, the equipment limitation, and plant competition. Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, plant cover, or both. Slope restricts the use of wheeled or tracked equipment on skid trails. Cable skidding generally is safer and disturbs less soil. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are generally not suited to urban uses. Slope is the main limitation.

Areas of these soils where slopes are greater than 45 percent are subject to slippage during periods of high rainfall.

The Hazleton, Fedscreek, and Kimper soils are in capability subclass VIIe.

HmF—Hazleton-Fedscreek-Marrowbone complex, 30 to 80 percent slopes, very stony

This complex consists of very deep to moderately deep, very steep, well drained soils on warm aspects of middle and lower mountainsides, on benches, and in coves. The Hazleton and Fedscreek soils are on concave middle and lower mountainsides, on benches, and in coves. The Marrrowbone soil is on convex and linear, middle mountainsides. These soils are too intricately mixed to be separated at the scale selected for mapping. They occur in a repeating pattern on the landscape. Stones cover about 2 percent of the soil surface. Areas are about 5 to 1,200 acres.

The Hazleton soil makes up about 35 percent of this complex, the Fedscreek soil 30 percent, the Marrowbone soil 15 percent, and included soils 20 percent.

Typically, the surface layer of the Hazleton soil is dark brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of 50 inches. In the upper part, to a depth of 13 inches, it is light yellowish brown channery sandy loam. In the middle part, to a depth of 28 inches, it is brownish yellow very channery sandy loam. In the lower part it is yellowish brown very flaggy fine sandy loam. The substratum to a depth of 62 inches is brownish yellow extremely channery fine sandy loam. It overlies interbedded shale, sandstone, and siltstone.

The Hazleton soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid or rapid. Available water capacity is moderate. The root zone is deep and very deep, but rock fragments restrict root penetration.

Typically, the surface layer of the Fedscreek soil is brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of 63 inches. In the upper part, to a depth of 12 inches, it is yellowish brown loam. In the middle part, to a depth of 36 inches, it is strong brown loam and mottled strong brown channery loam. In the lower part it is strong brown and yellowish brown very channery fine sandy loam. It overlies fractured sandstone, siltstone, and shale.

The Fedscreek soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is moderate. The root zone is deep and very deep.

Typically, the surface layer of the Marrowbone soil is dark brown fine sandy loam about 7 inches thick. The subsoil extends to a depth of 32 inches. In the upper part, to a depth of 27 inches, it is yellowish brown, brownish yellow, and strong brown fine sandy loam. In the lower part it is brownish yellow fine sandy loam. The substratum to a depth of 37 inches is strong brown very channery fine sandy loam. It overlies gray sandstone.

The Marrowbone soil is low in natural fertility and organic matter content. Permeability is moderate or moderately rapid. Available water capacity is moderate. The root zone is moderately deep. Depth to bedrock ranges from 20 to 40 inches.

Included with this complex in mapping are small areas of Shelocta and Kimper soils on lower mountainsides, on benches, and in coves. Also included are Dekalb and Gilpin soils on upper mountainsides. The included soils make up about 20 percent of this map unit. Individual areas are generally less than 10 acres.

The Hazleton, Fedscreek, and Marrowbone soils in this complex are used mainly for woodland.

These soils are generally not suited to cultivated crops, hay, or pasture. Slope, the erosion hazard, and stones on the surface are limitations.

These soils are moderately well suited to woodland. Black oak, white oak, scarlet oak, chestnut oak,

American beech, pignut hickory, yellow-poplar, Virginia pine, shortleaf pine, red maple, and hickory are native. Shortleaf pine, white oak, and eastern white pine are preferred for planting. Understory plants include trefoil, tickclover, pussytoes, sedum, lousewart, American beech, flowering dogwood, redbud, mapleleaf viburnum, gall-of-the-earth, New Jersey tea, panicum, early saxifrage, azalea, greenbrier, black gum, wild grape, woodsorrel, and horsebalm.

The concerns in managing timber on these soils are the erosion hazard, the equipment limitation, seedling mortality, and plant competition. Steep skid trails and roads are subject to rilling and gullying unless protected by adequate waterbars, plant cover, or both. Slope restricts the use of wheeled and tracked equipment on skid trails. Cable skidding generally is safer and disturbs less soil. Seedling mortality generally is moderate in summer because of high temperatures and inadequate moisture in the soil. Careful management of reforestation after harvesting helps to reduce undesirable plant competition.

These soils are generally not suited to urban uses. Slope is the main limitation.

Areas of these soils that have slopes greater than 45 percent and depths greater than 40 inches are subject to slippage during periods of high rainfall.

The Hazleton, Fedscreek, and Marrowbone soils are in capability subclass VIIe.

HsF—Hazleton-Fedscreek-Shelocta complex, 30 to 70 percent slopes, very stony

This complex consists of deep and very deep, very steep, well drained soils on middle and lower mountainsides, on benches, and in coves. The Hazleton soil is on concave middle mountainsides, on benches, and in coves. The Fedscreek soil is on convex and linear middle and lower mountainsides. The Shelocta soil is on convex lower mountainsides and benches. These soils are too intricately mixed to be separated at the scale selected for mapping. They occur in a repeating pattern on the landscape. Stones cover about 2 percent of the surface. Mapped areas are about 5 to 1,200 acres.

The Hazleton soil makes up about 30 percent of this complex, the Fedscreek soil 25 percent, Shelocta soil 20 percent, and included soils 25 percent.

Typically, the surface layer of the Hazleton soil is dark brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of 50 inches. In the upper part, to a depth of 13 inches, it is light yellowish brown channery sandy loam. In the middle part, to a depth of 28 inches, it is brownish yellow very channery sandy loam. In the lower part it is yellowish brown very flaggy fine sandy loam. The substratum to a depth of 62 inches is brownish yellow extremely channery fine sandy loam. It overlies interbedded shale, sandstone, and siltstone.

The Hazleton soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid or rapid. Available water capacity is moderate. The root zone is deep and very deep, but rock fragments restrict root penetration.

Typically, the surface layer of the Fedscreek soil is brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of 63 inches. In the upper part, to a depth of 12 inches, it is yellowish brown loam. In the middle part, to a depth of 36 inches, it is strong brown loam and channery loam that has mottles in the lower part. In the lower part, it is strong brown and yellowish brown very channery fine sandy loam. It overlies fractured sandstone, siltstone, and shale.

The Fedscreek soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid in the subsoil and moderate or moderately rapid in the substratum. Available water capacity is moderate. The root zone is deep and very deep.

Typically, the surface layer of the Shelocta soil is yellowish brown loam about 7 inches thick. The subsoil extends to a depth of 47 inches. In the upper part, to a depth of 24 inches, it is yellowish brown and brownish yellow loam. In the middle part, to a depth of 38 inches, it is yellowish brown channery silt loam. In the lower part, it is yellowish brown, mottled channery loam. The substratum to a depth of 62 inches is light olive brown, mottled very channery loam.

The Shelocta soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. Available water capacity is high. The root zone is deep or very deep.

Included with this complex in mapping are small areas of Dekalb, Gilpin, and Marrowbone soils on middle mountainsides and Kimper soils on lower mountainsides, on benches, and in coves. Included soils make up about 25 percent of this map unit. Individual areas are generally less than 10 acres.

The Hazleton, Fedscreek, and Shelocta soils in this complex are used mainly for woodland.

These soils generally are not suited to cultivated crops, hay, or pasture. Slope, the hazard of erosion, and stones on the surface are limitations.

These soils are moderately well suited to use as woodland. Black oak, white oak, scarlet oak, chestnut

oak, American beech, pignut hickory, yellow-poplar, Virginia pine, scarlet oak, black gum, hickory, and red maple are native on warm aspects. Northern red oak, yellow-poplar, white oak, black oak, black locust, black gum, American basswood, black walnut, cucumbertree, American beech, shortleaf pine, red maple, chestnut oak, and scarlet oak are native on cool aspects. Shortleaf pine, white ash, eastern white pine, and white oak are preferred for planting on warm aspects. Yellow-poplar, shortleaf pine, northern red oak, eastern white pine, white oak, white ash, and black walnut are preferred for planting on cool aspects. Understory plants on cool aspects include jewelweed, violets, wood nettle, black snakeroot, jack-in-the-pulpit, yellow mandarin, Christmas fern, wild geranium, waterleaf, bedstraw, bloodroot, sweet cicely, grape fern, thimbleweed, maidenhair fern, wild geranium, and Solomons seal. Understory plants on warm aspects include trefoil, tickclover, pussy-toes, sedum, American beach, flowering dogwood, redbud, mapleleaf viburnum, gall-of-the-earth, New Jersey tea, panicum, early saxifrage, azalea, greenbrier, black gum, wild grape, woodsorrel, and horsebalm.

The concerns in managing timber on these soils are the erosion hazard, the equipment limitation, seedling mortality, and plant competition. Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, plant cover, or both. Slope restricts the use of wheeled or tracked equipment on skid trails. Cable skidding generally is safer and disturbs the soil less. On warm aspects seedling mortality generally is moderate in summer because of high temperatures and inadequate moisture in the soil. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are generally not suited to urban uses. Slope is the main limitation.

Areas of these soils where slopes are greater than 45 percent and where depths are greater than 40 inches are subject to slippage during periods of high rainfall.

The Hazleton, Fedscreek, and Shelocta soils are in capability subclass VIIe.

Kn—Knowlton silt loam, rarely flooded

This is a very deep, nearly level, poorly drained soil. It is on stream terraces along the Levisa Fork of the Big Sandy River and its major tributaries. Slopes are smooth and slightly concave and range from 0 to 2 percent. Areas are irregularly shaped and about 5 to 25 acres.

Typically, the surface layer of the Knowlton soil is brown silt loam about 8 inches thick. The subsoil extends to a depth of 71 inches. In the upper part, to a depth of 15 inches, it is grayish brown mottled silty clay loam. In the middle part, to a depth of 59 inches, it is light brownish gray and light olive gray mottled silty clay loam. In the lower part it is mottled light brownish gray and grayish brown silty clay loam.

This soil is medium in natural fertility and low in organic matter content. Permeability is slow. Available water capacity is high. Tilth is good, but the optimum moisture range for cultivation is reduced by wetness. The soil is saturated in late winter and early spring by a seasonal high water table that is within 12 inches of the surface. The root zone is very deep. This soil is subject to rare flooding.

Included with this Knowlton soil in mapping are small areas of Allegheny, Cotaco, and Stokly soils and soils similar to the Knowlton soil but that are somewhat poorly drained. Included soils make up about 10 percent of this map unit. Individual areas of these soils are generally less than 2 acres.

This Knowlton soil is used mainly for pasture and hay.

Drained areas of this soil are moderately well suited to most cultivated crops. It is poorly suited to small grains because of a seasonal high water table. Farming operations are often delayed in undrained areas because of excessive wetness. Crop residue returned to the surface, cover crops, and crop rotation with grasses and legumes help to maintain desirable soil structure, good tilth, and the content of organic matter.

This soil is moderately well suited to pasture and hay crops that tolerate wetness. Drained areas of this soil are suited to a wide range of pasture and hay crops. Grazing before the plants are well established, overgrazing, or grazing when the soil is wet damages plants. The resulting thin ground cover increases weed competition and the need for early renovation. A well planned harvesting and clipping schedule is important in producing high yields.

This soil is well suited to woodland. Sweetgum, pin oak, red maple, boxelder, slippery elm, and American sycamore are native. Sweetgum, pin oak, green ash, and American sycamore are preferred for planting.

The main concerns for managing timber on this soil are equipment limitation, seedling mortality, and plant competition. The seasonal high water table restricts the use of equipment to periods when the soil is dry. Only trees that can tolerate seasonal wetness should be planted. Plant competition prevents adequate natural or artificial reforestation unless intensive site preparation and maintenance are used.

This soil is poorly suited to urban uses. Flooding and the seasonal high water table are limitations.

This Knowlton soil is in capability subclass IIIw.

MyB—Myra very channery fine sandy loam, 0 to 6 percent slopes

This very deep, nearly level and gently sloping, well drained soil is on ridgetops and benches. It formed in reshaped soil material from surface coal mining (fig. 10). Areas are irregularly shaped and range from about 5 to 200 acres.

Typically, the surface layer is grayish brown very channery fine sandy loam about 8 inches thick. The underlying material extends to a depth of 63 inches. In the upper part, to a depth of 18 inches, it is mottled grayish brown and dark brown very channery loam. In the middle part, to a depth of 42 inches, it is dark brown and brown mottled very channery loam. In the lower part it is dark grayish brown very channery loam.

This soil is low in natural fertility and organic matter content. Permeability is moderately slow or moderate. Available water capacity is moderate. The root zone is very deep, but root penetration is restricted by rock fragments and compaction.

This soil varies in its characteristics. Onsite investigation is required to accurately determine the suitability of a specific area for a particular use.

Included with this Myra soil in mapping are small areas of Bethesda, Dekalb, Fairpoint, Fedscreek, Hazleton, Kimper, Marrowbone, and Sharondale soils. Also included are areas where slopes are greater than 6 percent and some severely eroded and gullied areas. Included soils make up about 25 percent of this map unit. Individual areas are generally less than 5 acres.

This Myra soil is mainly reclaimed idle land. Most areas have been revegetated to tall fescue and sericea lespedeza. Some areas are used for pasture, woodland, and building sites.

This soil is generally not suited to cultivated crops.

This soil is moderately well suited to pasture and hay, but grasses and legumes are difficult to establish. Rock fragments and large stones restrict the use of equipment, and differential settlement is a hazard in places. A fast-growing, protective, permanent cover is needed. Before seeding the area, the spoil should be smoothed so that equipment can be used without interference in planting and harvesting.

This soil is moderately well suited to woodland. Many areas have been revegetated to loblolly pine, black locust, American sycamore, and sweetgum. Eastern white pine, white oak, loblolly pine, and black locust are preferred for planting.

The main concerns in managing timber on this soil are equipment limitation, seedling mortality, and plant competition. Rock fragments and large stones restrict the use of equipment. Soil compaction and large amounts of rock fragments can reduce seedling survival. Plant competition can be moderate in areas where tall fescue or sericea lespedeza is established.

If this soil is graded, reseeded, and planted to herbaceous or woody plants, it is a potential source of food and cover for wildlife. Any planting that provides food and enough cover to control soil erosion is beneficial to wildlife.

These soils are poorly suited to urban uses. Stones, differential settling potential, and moderate or moderately slow permeability are limitations.

This Myra soil is in capability subclass VIs.

MyD—Myra very channery fine sandy loam, 6 to 30 percent slopes

This is a very deep, sloping to steep, well drained soil on ridgetops and benches. It formed in reshaped soil material from surface coal mining. Areas are irregularly shaped and range from about 5 to 50 acres.

Typically, the surface layer is grayish brown very channery fine sandy loam about 8 inches thick. The underlying material extends to a depth of 63 inches. In the upper part, to a depth of 18 inches, it is mottled grayish brown and dark brown very channery loam. In the middle part, to a depth of 42 inches, it is dark brown and brown, mottled very channery loam. In the lower part it is dark grayish brown very channery loam.

This soil is low in natural fertility and organic matter content. Permeability is moderately slow or moderate. Available water capacity is moderate. The root zone is very deep, but rock fragments and surface compaction restrict root penetration.

This soil varies in its characteristics. Onsite investigation is required to accurately determine the suitability of a specific area for a particular use.

Included with this Myra soil in mapping are small areas of Bethesda, Dekalb, Fairpoint, Fedscreek, Hazleton, Kimper, Marrowbone, and Sharondale soils and some severely eroded and gullied areas. Included soils make up about 25 percent of this map unit. Individual areas are generally less than 5 acres.

This Myra soil consists mainly of reclaimed idle land. Most areas have been revegetated to tall fescue and sericea lespedeza. Some areas are used for pasture, woodland, and building sites.

This soil is generally not suited to cultivated crops.

This soil is moderately well suited to pasture and hay, but grasses and legumes are difficult to establish.

Figure 10.—A strip mined area in the southern part of Floyd County. In the mined area the soil is Myra very channery fine sandy loam, 0 to 6 percent slopes.

Rock fragments and large stones restrict the use of equipment, and differential settlement is a hazard in places. A fast-growing, protective, permanent plant cover is needed. Before seeding the area, smoothing the spoil facilitates the use of equipment in planting and harvesting.

This soil is moderately well suited to woodland. Many areas have been revegetated to loblolly pine, black locust, American sycamore, and sweetgum. Eastern white pine, white oak, loblolly pine, and black locust are preferred for planting.

The concerns in managing timber on this soil are seedling mortality and plant competition. In the steeper areas, the erosion hazard and equipment limitation are also concerns. Rock fragments and large stones also restrict the use of equipment. Soil compaction and numerous rock fragments can reduce seedling survival. Plant competition is moderate in areas where tall fescue or sericea lespedeza is established.

This soil provides a limited source of food and cover for wildlife. Plantings that consist of herbaceous plants, trees, and shrubs enhance wildlife habitat. Any planting that provides food and enough cover to control erosion is beneficial to wildlife.

These soils are generally not suited to urban use. Slope, stones, differential settlement potential, moderately slow permeability, and slippage are limitations.

This Myra soil is in capability subclass VIs.

MyF—Myra very channery fine sandy loam, 30 to 70 percent slopes, stony

This is a very deep, very steep, well drained soil on mountainsides. It formed in reshaped soil material from surface coal mining. Areas are irregularly shaped and range from about 5 to 300 acres.

Typically, the surface layer is grayish brown very

channery fine sandy loam about 8 inches thick. The underlying material extends to a depth of 63 inches. In the upper part, to a depth of 18 inches, it is mottled grayish brown and dark brown very channery loam. In the middle part, to a depth of 42 inches, it is dark brown and brown, mottled very channery loam. In the lower part it is dark grayish brown very channery loam.

This soil is low in natural fertility and organic matter content. Permeability is moderately slow or moderate. Available water capacity is moderate. The root zone is very deep, but root penetration is restricted by rock fragments and compaction.

This soil varies greatly in its characteristics. Onsite investigation is required for an accurate determination of the suitability of a specific area for a particular use.

Included with this Myra soil in mapping are small areas of Bethesda, Dekalb, Fairpoint, Fedscreek, Hazleton, Kimper, Marrowbone, and Sharondale soils and some severely eroded and gullied areas. Included soils make up about 25 percent of this map unit. Individual areas are generally less than 5 acres.

This Myra soil consists mainly of reclaimed idle land. Most areas have been revegetated to tall fescue and sericea lespedeza. Some areas are used for pasture and woodland.

This soil is generally not suited to cultivated crops, hay, or pasture. The steep outslopes, created by removal of soil, bedrock, and coal, commonly are unstable and are subject to slides. Differential settling is a hazard in places. Establishing a fast-growing, protective, and permanent plant cover helps to reduce runoff and to control erosion.

This soil is moderately well suited to woodland. Some areas have been revegetated to loblolly pine, black locust, American sycamore, and sweetgum. Eastern white pine, white oak, loblolly pine, and black locust are preferred for planting.

The concerns in managing timber on this soil are the erosion hazard, the equipment limitation, seedling mortality, and plant competition. Erosion is a severe hazard. Slope severely limits equipment use. Soil compaction and large amounts of rock fragments can reduce seedling survival. Seedling mortality can be severe in areas where tall fescue or sericea lespedeza has been previously established.

This soil provides a limited source of food and cover for wildlife. Plantings for wildlife should consist of herbaceous plants, trees, and shrubs. Any planting that provides food and enough cover to control soil erosion is beneficial to wildlife.

This soil is generally not suited to most urban uses. Slope, stones, differential settlement potential, moderate or moderately slow permeability, and slippage are limitations.

This Myra soil is in capability subclass VIIe.

NeD—Nelse loam, 4 to 25 percent slopes, frequently flooded

This is a very deep, gently sloping to steep, well drained soil on streambanks. It is along the Levisa Fork of the Big Sandy River. Slopes are short and concave to convex. Areas are long and narrow and range from 10 to 250 acres.

Typically, the surface layer of the Nelse soil is dark brown loam that has strata of loamy fine sand. It is about 8 inches thick. The underlying material extends to a depth of 80 inches. In the upper part, to a depth of 39 inches, it consists of bedding planes of brown and dark brown fine sandy loam and sand. In the lower part it is dark grayish brown and dark brown loamy fine sand that has bedding planes of fine sand.

This soil is medium in natural fertility and high in organic matter content. Permeability is moderately rapid or rapid. Available water capacity is moderate. The root zone is very deep. This soil is subject to frequent flooding.

Included with this Nelse soil in mapping are small areas of Allegheny, Chavies, and Grigsby soils and areas where slopes are more than 5 percent. Included soils make up about 10 percent of this map unit. Individual areas are generally less than 2 acres.

This Nelse soil is used mainly for woodland. In some less sloping, benched areas, it is used for gardens and pasture.

This soil is generally not suited to cultivated crops, hay, or pasture. Slope and flooding are limitations. If this soil is used as cropland, lime and fertilizer are needed. Conservation practices are needed to prevent streambank erosion.

This soil is well suited to woodland. Sweetgum, boxelder, silver maple, black willow, river birch, green ash, and American sycamore are native. Green ash, American sycamore, and sweetgum are preferred for planting.

The main concerns in managing timber on this soil are the equipment use limitation, seedling mortality, and plant competition. Equipment use is restricted and seedling mortality is severe in areas that are subject to flooding. Plant competition reduces natural or artificial reforestation unless intensive site preparation and maintenance are used.

This soil is generally not suited to most urban uses because of flooding and slope.

This Nelse soil in capability subclass IVe.

PsC—Potomac-Shelocta-Grigsby complex, 2 to 15 percent slopes

This complex consists of deep and very deep, gently sloping to moderately steep, somewhat excessively drained and well drained soils on flood plains, colluvial fans, and foot slopes. These soils are in narrow valleys in the southern part of Floyd County. The Potomac and Grigsby soils are on flood plains and have slopes of 2 to 4 percent. The Shelocta soil is on colluvial fans and foot slopes and have slopes of 4 to 15 percent. These soils are too intricately mixed to be separated at the scale selected for mapping. Areas are long and narrow and range from 5 to 350 acres.

The Potomac soil makes up about 40 percent of this complex, the Shelocta soil 30 percent, and the Grigsby soil 20 percent. The rest is included soils.

Typically, the surface layer of the Potomac soil is dark yellowish brown sandy loam about 11 inches thick. The underlying material extends to a depth of 62 inches. In the upper part, to a depth of 26 inches, it is dark yellowish brown very cobbly loamy sand. In the lower part it is dark yellowish brown extremely cobbly sand.

The Potomac soil is low in natural fertility and organic matter content. Permeability is moderate or moderately rapid in the surface layer and rapid or very rapid in the underlying layers. The available water capacity is low. The root zone is very deep, but rock fragments limit root penetration. Tilth is good. This soil is subject to occasional flooding.

Typically, the surface layer of the Shelocta soil is yellowish brown loam about 7 inches thick. The subsoil extends to a depth of 47 inches. In the upper part, to a depth of 24 inches, it is yellowish brown and brownish yellow loam. In the middle part, to a depth of 38 inches, it is yellowish brown channery silt loam. In the lower part it is yellowish brown, mottled channery loam. The substratum to a depth of 62 inches is light olive brown, mottled very channery loam.

The Shelocta soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. Available water capacity is high. The root zone is deep and very deep.

Typically, the surface layer of the Grigsby soil is dark yellowish brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of 42 inches. It is dark yellowish brown and yellowish brown fine sandy loam. The substratum to a depth of 62 inches is dark yellowish brown, stratified sandy loam and fine sandy loam.

The Grigsby soil is high in natural fertility and moderate in organic matter content. Permeability is moderately rapid or rapid. Available water capacity is high. A seasonal high water table is at a depth of 3.5 to 6 feet. The root zone is very deep. Tilth is good. This soil is subject to occasional flooding.

Included in mapping are small areas of Knowlton and Stokly soils and a few areas of Shelocta soils that have slopes greater than 15 percent. Included soils make up about 10 percent of this map unit. Individual areas are generally less than 3 acres.

The Potomac, Shelocta, and Grigsby soils in this complex are used mainly for pasture and hay. In many areas these soils are used for home sites and gardens.

In the less sloping areas, these soils are moderately well suited to cultivated crops. The hazard of erosion is severe on the steeper colluvial side slopes. Conservation tillage, crop residue returned to the surface, cover crops, and crop rotation with grasses and legumes help to control erosion and to maintain desirable soil structure, good tilth, and the content of organic matter.

These soils are well suited to hay and pasture. Improved varieties of grasses and legumes are needed to produce high quality hay and forage and to provide good ground cover. Grazing before the plants are well established, overgrazing, or grazing when the soil is wet damages plants. The resulting thin ground cover increases weed competition and the need for early renovation. A well planned harvesting and clipping schedule is important in producing high yields.

Surface runoff and overwash from adjacent soils in some areas can be reduced by constructing ditches near the foot of nearby hills to intercept the water. In some areas improving the stream channel can reduce overflow. Drainageways should be kept open and permanently vegetated to ensure adequate surface drainage.

These soils are well suited to woodland. A few areas are used for timber production. Northern red oak, white oak, eastern white pine, black walnut, American sycamore, yellow-poplar, eastern redcedar, cucumbertree, American beech, shortleaf pine, red maple, sweetgum, scarlet oak, chestnut oak, black oak, and hickory are native. Northern red oak, white oak, American sycamore, black walnut, eastern white pine, shortleaf pine, white ash, white oak, and yellow-poplar are preferred for planting.

The main concerns in managing timber on these soils are seedling mortality and plant competition. Seedling mortality can be severe in areas that are subject to flooding. In reforestation, careful management is needed to reduce plant competition.

These soils vary in suitability for urban uses. The lower-lying Potomac and Grigsby soils are generally not suited because of flooding. The Shelocta soil is moderately well suited to most urban uses, but slope is a limitation.

The Potomac soil is in capability subclass IVs, the Shelocta soil is in capability subclass IIIe, and the Grigsby soil is in capability subclass IIw.

RaC—Rayne-Gilpin complex, 6 to 15 percent slopes

This complex consists of deep, very deep, and moderately deep, sloping and moderately steep, well drained soils. These soils are on foothills in the northern part of Johnson County (fig. 11). The Rayne soil is on ridges and has slopes of 6 to 12 percent. The Gilpin soil is on side slopes and has slopes of 12 to 15 percent. These soils are too intricately mixed to be separated at the scale selected for mapping. They occur in a repeating pattern on the landscape. Areas are irregularly shaped and about 3 to 30 acres.

The Rayne soil makes up about 55 percent of this complex, the Gilpin soil 30 percent, and included soils 15 percent.

Typically, the surface layer of the Rayne soil is dark yellowish brown loam about 7 inches thick. The subsoil extends to a depth of 53 inches. In the upper part, to a depth of 12 inches, it is yellowish brown loam. In the middle part, to a depth of 31 inches, it is yellowish brown silt loam and loam. In the lower part it is yellowish brown, mottled loam. The substratum extends to a depth of 72 inches. It is yellowish brown, mottled silty clay loam and very channery silt loam. It overlies shale.

Typically, the surface layer of the Gilpin soil is brown loam about 5 inches thick. The subsoil, to a depth of 18 inches, is yellowish brown loam that has mottles in the lower part. The substratum to a depth of 28 inches is yellowish brown very channery loam. It overlies interbedded shale and siltstone.

The Rayne soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. Available water capacity is high. The root zone is deep and very deep.

The Gilpin soil is low in natural fertility and low or moderate in organic matter content. Permeability and the available water capacity are moderate. The root zone is moderately deep. Depth to bedrock ranges from 20 to 40 inches.

Included with this complex in mapping are small areas of soils similar to the Gilpin soil but that are less than 20 inches to shale bedrock. Also included are some areas where slopes are greater than 15 percent. Included soils make up about 15 percent of this map unit. Individual areas are generally less than 3 acres.

The Rayne and Gilpin soils in this complex are used mainly for cropland, hay, and pasture. In many areas these soils are used for home sites and gardens.

In the less sloping areas, these soils are suited to cultivated crops. The hazard of erosion is severe on the steeper side slopes. Conservation tillage, crop residue returned to the surface, cover crops, and crop rotation with grasses and legumes help to control erosion and to maintain desirable soil structure, good tilth, and the content of organic matter.

These soils are well suited to hay and pasture. Improved varieties of grasses and legumes are needed to produce high quality hay and forage and to provide good ground cover. Grazing before the plants are well established, overgrazing, or grazing when the soil is wet damages plants. The result is a thin ground cover that can increase weed competition and the need for early renovation. A well planned harvesting and clipping schedule is important in producing high yields.

These soils are well suited to woodland, but few areas are used for timber production. Northern red oak, yellow-poplar, shortleaf pine, white oak, black oak, scarlet oak, chestnut oak, and Virginia pine are native. Eastern white pine, yellow-poplar, white oak, northern red oak, and shortleaf pine are preferred for planting. Plant competition is the main management concern on these soils. It prevents adequate natural or artificial reforestation unless intensive site preparation and maintenance are used.

These soils are suited to most urban uses. Depth to rock and slope are limitations on the Gilpin soil.

The Rayne and Gilpin soils are in capability subclass IIIe.

RoF—Rigley-Rock outcrop complex, 30 to 70 percent slopes

This complex consists of a very deep, very steep, well drained soil on side slopes and benches between Rock outcrop. Rock outcrop consists of areas of exposed sandstone. This soil and the areas of Rock outcrop are too intricately mixed to be separated at the scale selected for mapping. They are in a repeating pattern on the landscape. Mapped areas are about 30 to 200 acres.

The Rigley soil makes up about 55 percent of this complex, Rock outcrop 15 percent, and included soils 30 percent.

Typically, the surface layer of the Rigley soil is dark brown and dark yellowish brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of

Figure 11.—Tobacco and cattle farm on the more rolling hills in the northern part of Johnson County. The soils are Rayne-Gilpin complex, 6 to 15 percent slopes.

55 inches. In the upper part, to a depth of 14 inches, it is brownish yellow sandy loam. In the middle part, to a depth of 32 inches, it is yellowish brown sandy loam. In the lower part it is brownish yellow channery sandy loam. The substratum to a depth of 61 inches is brownish yellow, mottled channery sandy loam.

The Rigley soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid. Available water capacity is moderate. The root zone is very deep.

Typically, Rock outcrop consists of discontinuous sandstone bluffs. The bluffs follow, in a repeating pattern, the contours of the slopes. The bluffs range from about 5 to 50 feet in height.

Included with this complex in mapping are small areas of soils similar to the Rigley soil that are less than 60 inches to bedrock. Also included are areas of Grigsby and Stokly soils on narrow flood plains between adjacent hillsides. Included soils make up about 30 percent of this map unit. Individual areas are generally less than 5 acres.

The Rigley soil in this complex is used mainly for woodland.

This complex is generally not suited to cultivated crops, hay, or pasture. Slope, the hazard of erosion, and rock outcrops are limitations.

The Rigley soil is moderately well suited to use as woodland. Shortleaf pine, eastern hemlock, white oak, black oak, hickory, scarlet oak, and American beech are native. Eastern white pine, shortleaf pine, and white oak are preferred for planting.

The main concerns for managing timber on the Rigley soil are the erosion hazard, the equipment limitation, and plant competition. Steep skid trails and roads are subject to rilling and gullying unless they are protected by a combination of adequate water bars and plant cover. Slope, rock outcrop, and bluffs restrict the use of wheeled or tracked equipment on skid trails. Cable skidding generally is safer and disturbs less soil. Reforestation after harvesting must be managed carefully to prevent plant competition.

This complex is generally not suited to urban uses. Slope and rock outcrop are the main limitations.

The Rigley soil is in capability subclass VIIe. Rock outcrop is in capability subclass VIIIs.

SaF—Sharondale-Hazleton-Kimper complex, 30 to 80 percent slopes, extremely stony

This complex consists of deep and very deep, very steep, well drained soils on cool aspects of middle and lower mountainsides, benches, and coves. The Sharondale soil is on concave, middle and lower mountainsides, on benches, and in coves. The Hazleton soil is on concave to linear, middle and lower mountainsides and on benches. The Kimper soil is on lower mountainsides, on benches, and in coves. These soils are too intricately mixed to be separated at the scale selected for mapping. They occur in a repeating pattern on the landscape. Stones cover about 10

percent of the soil surface. Mapped areas are about 5 to 1,200 acres.

The Sharondale soil makes up about 35 percent of this complex, the Hazleton soil 25 percent, the Kimper soil 15 percent, and included soils 25 percent.

Typically, the surface layer of the Sharondale soil is very dark grayish brown channery or very channery loam about 16 inches thick. The subsoil extends to a depth of 61 inches. In the upper part, to a depth of 24 inches, it is dark brown extremely flaggy loam. In the lower part it is dark yellowish brown and brown very channery loam and yellowish brown extremely flaggy fine sandy loam. The substratum to a depth of 78 inches is yellowish brown very channery fine sandy loam.

The Sharondale soil is high in natural fertility and organic matter content. Permeability is moderately rapid. Available water capacity is high. The root zone is very deep, but rock fragments restrict root penetration.

Typically, the surface layer of the Hazleton soil is brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of 50 inches. In the upper part, to a depth of 13 inches, it is light yellowish brown channery sandy loam. In the middle part, to a depth of 28 inches, it is brownish yellow very channery sandy loam. In the lower part it is yellowish brown very flaggy fine sandy loam. The substratum to a depth of 62 inches is brownish yellow extremely channery fine sandy loam. It overlies interbedded shale, sandstone, and siltstone.

The Hazleton soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid or rapid. Available water capacity is moderate. The root zone is deep and very deep, but rock fragments restrict root penetration.

Typically, the surface layer of the Kimper soil is dark brown loam about 6 inches thick. The subsoil extends to a depth of 63 inches. In the upper part, to a depth of 19 inches, it is dark brown and yellowish brown silt loam. In the middle part, to a depth of 44 inches, it is yellowish brown channery silt loam and very channery loam. In the lower part it is yellowish brown, mottled very channery loam. The substratum to a depth of 66 inches is grayish brown and strong brown very channery loam. It overlies interbedded shale, sandstone, and siltstone.

The Kimper soil is medium in natural fertility and high in organic matter content. Permeability is moderate or moderately rapid. Available water capacity is high. The root zone is very deep.

Included in mapping are small areas of Dekalb, Gilpin, and Marrowbone soils on middle mountainsides and Fedscreek and Shelocta soils on lower mountainsides and in coves. Included soils make up about 25 percent of this map unit. Individual areas are generally less than 10 acres.

The Sharondale, Hazleton, and Kimper soils in this complex are used mainly for woodland.

These soils are generally not suited to cultivated crops, hay, or pasture. Slope, the hazard of erosion, and stones on the surface are limitations.

These soils are moderately well suited to woodland. Yellow-poplar, black locust, American basswood, American beech, Virginia pine, northern red oak, cucumbertree, black walnut, sugar maple, white ash, white oak, black oak, and sweet birch are native. Yellow-poplar, black walnut, northern red oak, white oak, eastern white pine, shortleaf pine, and white ash are preferred for planting. Understory plants include jewelweed, violets, wood nettle, black snakeroot, jack-in-the-pulpit, yellow mandarin, Christmas fern, wild geranium, waterleaf, bedstraw, bloodroot, white bergamot, sweet cicely, grape fern, thimbleweed, maidenhair fern, wild geranium, and Solomons seal.

The main concerns in managing timber on these soils are the erosion hazard, the equipment limitation, and plant competition. Steep skid trails and roads are subject to rilling and gullying unless they are protected by a combination of adequate water bars and plant cover. Slope restricts the use of wheeled or tracked equipment on skid trails. Cable skidding generally is safer and disturbs less soil. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are generally not suited to urban uses. Slope is the main limitation.

Areas of these soils where slopes are greater than 45 percent are subject to slippage during periods of high rainfall.

The Sharondale, Hazleton, and Kimper soils are in capability subclass VIIe.

SeC—Shelocta loam, 6 to 15 percent slopes

This deep and very deep, sloping and moderately steep, well drained soil is on foot slopes and colluvial fans. Slopes are rounded and are concave or convex. Areas are long and narrow or fan shaped and are about 3 to 15 acres.

Typically, the surface layer is yellowish brown loam about 7 inches thick. The subsoil extends to a depth of 47 inches. In the upper part, to a depth of 24 inches, it is yellowish brown and brownish yellow loam. In the middle part, to a depth of 38 inches, it is yellowish brown, mottled channery silt loam. In the lower part it is yellowish brown channery loam. The substratum to

a depth of 62 inches is light olive brown, mottled very channery loam.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. Available water capacity is high. The root zone is deep and very deep.

Included with this Shelocta soil in mapping are small areas of Allegheny, Fedscreek, and Hazleton soils. Included soils make up about 10 percent of this map unit. Individual areas are generally less than 2 acres.

This Shelocta soil is used mainly for pasture and hay. In some areas it is used for home sites and gardens.

This soil is moderately well suited to cultivated crops. The hazard of erosion is severe if conventional tillage is used. Conservation tillage, crop residue returned to the surface, cover crops, and crop rotation with grasses and legumes help to control erosion and to maintain desirable soil structure, good tilth, and the content of organic matter.

This soil is well suited to hay and pasture. Improved varieties of grasses and legumes are needed to produce high quality hay and forage and to provide good ground cover. Grazing before the plants are well established, overgrazing, or grazing when the soil is wet damages plants. The resulting thin ground cover increases weed competition and the need for early renovation. A well planned harvesting and clipping schedule is important in producing high yields.

This soil is well suited to woodland, but few areas are used for timber production. White oak, yellow-poplar, cucumbertree, American beech, shortleaf pine, red maple, scarlet oak, chestnut oak, and black oak are native. Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, and northern red oak are preferred for planting. Plant competition is the main management concern. It prevents adequate natural or artificial reforestation unless intensive site preparation and maintenance are used.

This soil is suited to most urban uses. Slope is a limitation.

This Shelocta soil is in capability subclass IIIe.

ShC—Shelocta-Grigsby-Stokly complex, 2 to 15 percent slopes

This complex consists of deep and very deep, gently sloping to moderately steep, well drained and somewhat poorly drained soils on flood plains, colluvial fans, and foot slopes. These soils are in narrow valleys in Johnson County and in the northern and central parts of Floyd County. The Shelocta soil is on colluvial fans and foot slopes. It has slopes of 4 to 15 percent. The Grigsby soil is on flood plains. It has slopes of 2 to 4 percent. The Stokly soil is on flood plains. It has slopes of 2 to 3 percent. These soils are too intricately mixed to be separated at the scale selected for mapping. They occur in a repeating pattern on the landscape. Areas are long and narrow and are about 5 to 350 acres.

The Shelocta soil makes up about 55 percent of this complex, the Grigsby soil 30 percent, the Stokly soil 10 percent, and included soils 5 percent.

Typically, the surface layer of this Shelocta soil is yellowish brown loam about 7 inches thick. The subsoil extends to a depth of 47 inches. In the upper part, to a depth of 24 inches, it is yellowish brown and brownish yellow loam. In the middle part, to a depth of 38 inches, it is yellowish brown channery silt loam. In the lower part it is yellowish brown, mottled channery loam. The substratum to a depth of 62 inches is light olive brown, mottled very channery loam.

The Shelocta soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. Available water capacity is high. The root zone is deep and very deep.

Typically, the surface layer of the Grigsby soil is dark yellowish brown fine sandy loam about 5 inches thick. The subsoil to a depth of 42 inches is dark yellowish brown and yellowish brown fine sandy loam. The substratum to a depth of 62 inches is dark yellowish brown, stratified sandy loam and fine sandy loam.

The Grigsby soil is high in natural fertility and moderate in organic matter content. Permeability is moderate or moderately rapid. Available water capacity is high. A seasonal high water table is at a depth of 3.5 to 6 feet. The root zone is very deep. Tilth is good. This soil is subject to occasional flooding.

Typically, the surface layer of the Stokly soil is dark brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 38 inches. In the upper part, to a depth of 17 inches, it is dark brown, mottled fine sandy loam. In the middle part, to a depth of 32 inches, it is light grayish brown, mottled fine sandy loam. In the lower part it is mottled light grayish brown and brown fine sandy loam. The substratum extends to a depth of 62 inches. In the upper part, to a depth of 52 inches, it is light grayish brown and light yellowish brown fine sandy loam. In the lower part it is light grayish brown, mottled sandy loam.

The Stokly soil is low in natural fertility and organic matter content. Permeability is moderately rapid. Available water capacity is moderate. The root zone is

very deep. Tilth is good, but wetness reduces the optimum moisture range for cultivation. This soil is saturated in late winter and early spring by a seasonal high water table within 6 to 12 inches of the surface. This soil is subject to occasional flooding.

Included with this complex in mapping are small areas of Knowlton soils and Udorthents. Included soils make up about 5 percent of this map unit. Individual areas are generally less than 3 acres.

The Shelocta, Grigsby, and Stokly soils in this complex are used mainly for pasture and hay. In many areas these soils are used for home sites and gardens.

In the less sloping areas, these soils are moderately well suited to cultivated crops. The hazard of erosion is very severe on the steeper side slopes. Conservation tillage, crop residue returned to the surface, cover crops, and crop rotations with grasses and legumes help to control erosion and to maintain desirable soil structure, good tilth, and the content of organic matter.

These soils are well suited to hay and pasture. Improved varieties of grasses and legumes are needed in producing high quality hay and forage and in providing good ground cover. Grazing before the plants are well established, overgrazing, or grazing when the soil is wet damages plants. The resulting thin ground cover increases weed competition and the need for early renovation. A well planned harvesting and clipping schedule is important in producing high yields.

Surface runoff and overwash from adjacent soils in some areas can be reduced by constructing ditches near the foot of nearby hills to intercept the water. In some areas improving the stream channel reduces overflow. Drainageways should be kept open and permanently vegetated to ensure adequate surface drainage.

These soils are well suited to woodland, but few areas are used for timber production. White oak, yellow-poplar, cucumbertree, American beech, shortleaf pine, red maple, scarlet oak, chestnut oak, black oak, northern red oak, black walnut, American sycamore, white ash, river birch, sweetgum, and hickory are native. Yellow-poplar, eastern white pine, shortleaf pine, white ash, black walnut, white oak, northern red oak, American sycamore, sweetgum, and green ash are preferred for planting.

The main concerns in managing timber on these soils are the equipment limitation, seedling mortality, and plant competition. The seasonal high water table can restrict the use of equipment on the Stokly soil to periods when the soil is dry. Seedling mortality can be moderate in areas that are subject to flooding. Reforestation must be managed carefully to reduce plant competition.

These soils vary in suitability for urban use. The low-lying Grigsby and Stokly soils are poorly suited because of flooding. The seasonal high water table is also a limitation on the Stokly soil. The Shelocta soil is moderately well suited to most urban uses, but slope is a limitation.

The Shelocta soil is in capability subclass IIIe and the Grigsby and Stokly soils are in capability subclass IIw.

St—Stokly fine sandy loam, occasionally flooded

This is a very deep, nearly level and gently sloping, somewhat poorly drained soil. It is on flood plains along the tributaries of the Levisa Fork of the Big Sandy River. Slopes are slightly concave and range from 0 to 3 percent. Areas are mostly long and narrow and are about 5 to 25 acres.

Typically, the surface layer of the Stokly soil is dark brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 38 inches. In the upper part, to a depth of 17 inches, it is dark brown, mottled fine sandy loam. In the middle part, to a depth of 32 inches, it is light brownish gray, mottled fine sandy loam. In the lower part it is mottled light brownish gray and brown fine sandy loam. The substratum extends to a depth of 62 inches. In the upper part, to a depth of 52 inches, it is light brownish gray and light yellowish brown fine sandy loam. In the lower part it is light brownish gray, mottled sandy loam.

This soil is low in natural fertility and organic matter content. Permeability is moderately rapid. Available water capacity is moderate. The root zone is very deep. Tilth is good, but the seasonal high water table reduces the optimum moisture range for cultivation. It is saturated in late winter and early spring by a seasonal high water table within 6 to 12 inches of the surface. This soil is subject to occasional flooding.

Included with this Stokly soil in mapping are small areas of Grigsby and Knowlton soils and soils that have less sand throughout than typical for the Stokly soil. Included soils make up about 10 percent of this map unit. Individual areas are generally less than 2 acres.

This Stokly soil is used mainly for pasture and hay or for sites for houses and gardens. In some small areas it is used for cultivated crops.

In drained areas this soil is moderately well suited to cultivated crops. It is poorly suited to small grains because of a seasonal high water table. Farming

operations are often delayed in undrained areas because of the seasonal high water table. Crop residue returned to the surface, cover crops, and crop rotation with grasses and legumes help to control erosion and to maintain desirable soil structure, good tilth, and the content of organic matter.

This soil is moderately well suited to water-tolerant pasture and hay. Drained areas of this soil are suited to a wide range of pasture and hay crops. Improved varieties of grasses and legumes are needed to produce high quality hay and forage and to provide a good ground cover. Grazing before the plants are well established, overgrazing, or grazing when the soil is wet damages plants. The resulting thin ground cover increases weed competition and the need for early renovation. A well planned harvesting and clipping schedule is important in producing high yields.

This soil is well suited to woodland, but few areas are used for timber production. Yellow-poplar, white oak, black oak, red maple, American sycamore, white ash, river birch, and sweetgum are native. Eastern white pine, American sycamore, sweetgum, yellow-poplar, and green ash are preferred for planting.

The main concerns for managing timber on this soil are the equipment limitation, seedling mortality, and plant competition. The seasonal high water table can restrict the use of equipment to periods when the soil is dry. Trees that can tolerate seasonal wetness can grow on this soil. Plant competition prevents adequate natural or artificial reforestation unless intensive site preparation and maintenance are used.

This soil is poorly suited to most urban uses. Flooding and the seasonal high water table are limitations.

This Stokly soil is in capability subclass IIw.

UrC—Udorthents-Urban land complex, 0 to 15 percent slopes

This complex consists of very deep, nearly level to moderately steep soil material called Udorthents and Urban land. Most areas of this complex are on stream terraces along the Levisa Fork of the Big Sandy River at Prestonsburg and Paintsville. The areas were created by filling valleys with soil material from highway construction.

Udorthents make up about 55 percent of this complex, Urban land 20 percent, and included soils 25 percent.

On Udorthents, the original soil material has been altered or mixed with underlying rock material. Consequently, identification of soil features is not practical. The major soil features are highly variable, and no area is typical. In most areas the bedrock is very deep and rock fragments vary in size, shape, and amount. In many places the soil material was transported several hundred yards from the original site to the fill area.

Urban land consists of areas of Udorthents covered by streets, highways, parking lots, buildings, and other structures where the underlying soil material has been so altered that identification of the original soil is not feasible.

Included with this complex in mapping are small areas of Allegheny, Cotaco, Knowlton, and Nelse soils. Included soils make up about 25 percent of this map unit. Individual areas are generally less than 2 acres.

Most areas of this complex are used for commercial or residential development or are under development. Udorthents in this complex consist of a small percentage of natural soil material. Hence, they are not suited to use as cropland, pasture, hay, or woodland. The included soils are used for parks, lawns, gardens, and building sites. They are suited to vegetable and flower gardens, trees, and shrubs.

Because of the contrasting and variable nature of the soils in this complex, onsite investigation is needed to determine the suitability and limitations for any proposed use. Maintaining existing plant cover, establishing plant cover in unprotected areas, and properly disposing surface water help to control erosion and sedimentation.

Udorthents are in capability subclass VIs. Urban land is in capability subclass VIIIs.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming

methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 24,000 acres meets the soil requirements for prime farmland. This amounts to nearly 6 percent of the total acreage of the survey area. All this acreage is on flood plains of the Big Sandy River and its trbutaries. Some small plots are used for corn and tobacco. But most areas are used for hay and pasture. Industrial and urban expansion is a major threat to these areas of prime farmland. The mountainous uplands do not have suitable building sites. The result has been rapid development on flood plains.

The map units in the survey area that are considered prime farmland are listed at the end of this section. This list does not constitute a recommendation for a particular land use. For some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

The map units identified as prime farmland in Floyd and Johnson Counties are:

AbB Allegheny loam, 2 to 6 percent slopes, rarely flooded
AeB Allegheny loam, 2 to 6 percent slopes, occasionally flooded
ChB Chavies fine sandy loam, 2 to 6 percent slopes, rarely flooded
Co Cotaco loam, rarely flooded
Gr Grigsby fine sandy loam, occasionally flooded
Kn Knowlton silt loam, rarely flooded (where drained)
St Stokly fine sandy loam, occasionally flooded (where drained)

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop (*8*). Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major

reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey (*19*).

Capability classes, the broadest groups, are designated by numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation (*19*).

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Charles A. Foster, forester, Natural Resources Conservation Service, helped to prepare this section.

Before settlement, the entire area now known as Floyd and Johnson Counties was forested. Since then, the forested acreage has declined about 15 percent in Floyd County and 20 percent in Johnson County (*11*). However, the remaining stands have been altered through logging, fire, land clearing and abandonment, tree disease, and surface mining.

The original mixed mesophytic forest consisted mainly of about 20 dominant species. These included yellow-poplar, American chestnut, red oak, white oak, American beech, and yellow buckeye. These trees grew on moist, well drained, deep soils that had thick layers of humus. Land clearing, mining, and soil erosion have increased the range of the xeric forests. Oak-hickory, the dominant timber type, makes up about 60 percent of the woodland acreage. The maple-beech-birch type makes up about 25 percent; pine and oak-gum types, 7 percent; elm-ash-red maple type, 5 percent; and oak-pine type, 3 percent (*11*).

At first, timber was cut primarily to clear land for farming. Bottom land was cleared first. But the trees could neither be used nor sold, so they were burned in "log rollings." Some species, mainly yellow-poplar, black walnut, and white oak, were used in small amounts for building, fencing, and furnituremaking. These species continued to be cut for developing markets in the 1880's. Logging then caused a gradual deterioration of the quality of the forest in an individual area. At the turn of the century, poorer quality, smaller-size, and less desirable species were harvested. Oak trees were cut for railroad crossties. Small, circular sawmills began operating in the culled-over areas.

After the best timber was cut, sawmills began to shut down. The workers in the company mills moved on. Those who remained turned to farming. Much of the bottom land was occupied, so steep slopes were cleared for corn crops. The natural fertility and topsoil on mountainsides depleted rapidly. Farmers who had logged in fall and winter now cleared woodland for new fields instead. Land clearing increased during the Great Depression as people from industrial areas returned to the hills.

The gradual clearing of hillsides continued until about 1950. Then began a decade or more of land abandonment. People moved from rural areas into

towns or they left Kentucky. The cleared hillsides reverted once again to woody growth.

During the late 1950's and early 1960's, State and Federal agencies implemented a tree planting program that accelerated reforestation. Since 1951, the forested acreage of Floyd and Johnson Counties has increased. Reforestation occurred through tree planting and natural succession and despite increased surface mining of coal.

Floyd County takes in about 210,000 acres of commercial forest land. Johnson County takes in about 135,000 acres. The average forest growth is well below the potential of most sites. Most woodlands are not well stocked because of fires and past cutting practices. In the past the best trees were taken and the worst were left.

Fires have caused persistent problems in forest management in Floyd and Johnson Counties. Because of repeated fires, many areas consist of poor quality trees. A fire on the steep terrain kills nearly every tree. Large trees that are not killed generally are scarred and begin to decay. The U.S. Forest Service in Kentucky has estimated the average loss of forest fires at $83 per acre per fire.

Soils vary in their ability to produce trees. Depth, fertility, texture, and the available water capacity influence tree growth. Elevation, aspect, and climate determine the kinds of trees that can grow on a site. Available water capacity and depth of the root zone are major influences of tree growth. Elevation and aspect are of particular importance in mountainous areas.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to fertilization than others, and some are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special efforts to reforest. In the section "Detailed Soil Map Units," each map unit in the survey area suitable for producing timber presents information about productivity, limitations for harvesting timber, and management concerns for producing timber. The common forest understory plants are also listed. Table 7 summarizes this forest information and rates the soils for a number of factors to be considered in management. *Slight, moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be

necessary. Expected mortality is more than 50 percent.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The soils that are commonly used to produce timber have the yield predicted in cubic feet and board feet. The yield is predicted at the point where mean annual increment culminates.

The site index is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands (*5,6,7,13,14,15*).

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It generally is the most common species on the soil, the most productive, and the determinant of the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have

slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Ray Toor, wildlife biologist, Natural Resources Conservation Service, helped to prepare this section.

Floyd and Johnson Counties have valuable fish and wildlife resources. Streams, rivers, and manmade impoundments provide the habitat for fish. Habitat for wildlife is scattered throughout the area in the mixed forestland and openland.

Many soils found in Floyd and Johnson Counties are suitable for impounding water. Pounds, small streams, and large impoundments are stocked and managed for largemouth bass, channel catfish, bluegill, walleye, stripped bass, and rainbow trout. The Levisa Fork of the Big Sandy is the only major river in the survey area. Paint Creek, Hood Creek, Jenneys Creek, Johns Creek, Abotts Creek, Beaver Creek, and Mud Creek are the major tributaries. Manmade impoundments include Dewey Lake in Floyd County and Paintsville Lake in Johnson County.

Very little aquaculture exists in Floyd and Johnson Counties. Expansion of aquaculture will depend on adequate water supply, improvement of water quality, and marketing.

The major game species of wildlife in the survey area include white-tailed deer, gray squirrel, cottontail rabbit, ruffed grouse, raccoon, and gray and red fox. Some bobwhite quail and mourning dove inhabit the survey area. Eastern wild turkey are being reintroduced.

Waterfowl are common in the survey area during the migration period. The species include mallards, teal, widgeon, and Canada geese. Wood ducks are more permanent and nest in the survey area.

Successful management of wildlife on any tract of land requires that food, cover, and water be available in a suitable combination. Lack of any one of these necessities, an unfavorable balance among them, or inadequate distribution of them may limit the reproduction and dissemination of desired kinds of wildlife. Soils information provides a valuable tool in creating, improving, or maintaining suitable food, cover, and water for wildlife. Soil interpretations for wildlife habitat aid in selecting the more suitable sites for various kinds of management. They serve as indicators of the intensity of management needed to achieve satisfactory results. They also serve as a means of showing why it may not be generally feasible to manage a particular area for a given kind of wildlife. Interpretations also serve in broad scale planning of wildlife management areas, parks, and nature areas or for acquiring wildlife lands (*3*).

In table 9, the soils in Floyd and Johnson Counties are rated according to their potential for providing habitat for various kinds of wildlife (*34*). This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

Elements of wildlife habitat

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are orchard grass, timothy, Kentucky bluegrass, white clover, and alfalfa.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, aster, tickclover, and cinquefoil.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are Virginia pine, eastern white pine, and redcedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, cattail, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, constructed wetlands, and ponds.

Habitat for various kinds of wildlife

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy, shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, muskrat, mink, and beaver.

Land used for cropland, pastureland, or woodland also furnishes quality habitat for many kinds of wildlife when practices beneficial to wildlife are effectively applied. These practices include crop rotation, crop residue management, fallow spring disking of idle field borders, stripmowing, and leaving small areas of unharvested grain next to good cover.

Conservation practices such as carefully planned mechanical mowing, deferred grazing, prescribed grazing systems, selective brush management, and maintaining shrub field borders are often beneficial to wildlife on improved pastureland.

Other practices employed in woodland areas which are beneficial to wildlife include clearing and thinning selectively; planting winter annuals on pipeline right-of-ways, firebreaks, and open areas; and protecting den trees and quality mast-producing trees.

Some practices are harmful to wildlife. These include indiscriminate burning and use of chemicals for killing weeds and insects, heavy grazing, clean fall plowing, clear cutting of timber, draining of wetland depressions, and removal of all den and mast-producing trees.

Proper application of conservation practices must be based on the habitat needs of the wildlife to be

managed. Arbitrarily applied, many of these practices could be detrimental rather than beneficial. When managing for game species, many nongame species are also generally benefited. The Natural Resources Conservation Service, Kentucky Department of Fish and Wildlife Resources, and the Kentucky Agricultural Extension Service can provide technical assistance in the planning or application of needed wildlife management practices.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a

seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, and depth to bedrock affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones, boulders, and soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, or organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; and susceptibility to flooding. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of erosion, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 20.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas (*21*). Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 20.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a

percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields (*16*).

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, more than 6 percent; and *very high*, greater than 9 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). *Common* is used when the occasional and frequent classes are grouped for certain purposes. Duration is expressed as *very brief* if less than 2

days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Physical and Chemical Analyses of Selected Soils

The results of analysis of several typical pedons in the survey area are given in tables 17, 18, and 19. The results of physical analysis are given in table 17, and those of chemical analysis are given in table 18. The sand mineralogy is given in table 18. The data are for soils sampled at carefully selected sites. Unless otherwise indicated, the pedons are typical of the series. They are described in the section "Soil Series and Their Morphology." Soil samples were analyzed by the Kentucky Agricultural Experiment Station.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods (*22*).

Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all material less than 2 mm (3A1).

Clay—(fraction less than 0.002 mm) pipette extraction,

weight percentages of material less than 2 mm (3A1).

Carbonate clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of material less than 2 mm (3A1d).

Organic carbon—dichromate, ferric sulfate titration (6A1a).

Extractable acidity—barium chloride-triethanolamine I (6H1a).

Cation-exchange capacity—ammonium acetate, pH 7.0, (5A1a).

Base saturation—ammonium acetate, pH 7.0 (5C1).

Base saturation—sum of cations, TEA, pH 8.2 (5C3).

Available phosphorus—Procedure (656) Kentucky Agricultural Experiment Station.

Field Sampling—site selection (1A1).

Field Sampling—soil sampling (1A2).

Laboratory Preparation—standard (air dry) material (1B1).

Data Sheet Symbols— (2B).

Particles—greater than 2mm by field or laboratory weighing (3B1a).

Particles—(specified size) 2mm (2A2).

Particles—less than 2mm (A1).

Extractable Bases (5B1a).

Exchangeable Acidity(H+A1) method of Yuan procedure 67-3.52, Part 2, methods of analysis, ASA. 1965.

Calcium Carbonate Equivalent—procedure (23b) USDA- Handbook 60, USDA Salinity Laboratory 1954 (6N7).

Engineering Index Test Data

Table 20 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are representative of the series described in the section "Soil Series and Their Morphology." The soil samples were tested by the Soil Mechanics Laboratory, Fort Worth, Texas.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*23*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 21 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol.* An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fluvaquents (*Fluv*, meaning flood plain, plus *aquent*, the suborder of the Entisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, mixed, acid, mesic Aeric Fluvaquents.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series. The Stokly series is an example of coarse-loamy, mixed, acid, mesic Aeric Fluvaquents.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (*26*). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (*23*) and in "Keys to Soil Taxonomy" (*25*). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Allegheny Series

The Allegheny series consists of very deep, well drained soils that formed in mixed alluvium derived from sandstone, siltstone, and shale (fig. 12). Permeability is moderate. These soils are on stream terraces and alluvial fans. Slopes range from 2 to 15

percent. Allegheny soils are fine-loamy, mixed, mesic Typic Hapludults.

Allegheny soils are on the same landscape as Chavies, Cotaco, Grigsby, Knowlton, Nelse, and Stokly soils. Chavies and Stokly soils are coarse-loamy. Cotaco soils are moderately well drained or somewhat poorly drained. Stokly soils are somewhat poorly drained. Grigsby soils are on flood plains and are coarse-loamy. Knowlton soils are fine-silty and are poorly drained. Nelse soils are coarse-loamy and are on the steeper slopes.

Typical pedon of Allegheny loam, 2 to 6 percent slopes, rarely flooded; in Johnson County, about 0.5 mile north of the River, Kentucky, Post Office on Kentucky Highway 581, 500 feet east of Jenny Wiley grave site; in the Offutt Quadrangle:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure parting to weak fine granular; very friable; many fine and medium roots; medium acid; clear smooth boundary.

Bt1—8 to 15 inches; yellowish brown (10YR 5/6) loam; 20 percent tonguing and coatings of surface material; moderate medium subangular blocky structure; firm; common fine roots; common fine tubular pores; common faint clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt2—15 to 28 inches; yellowish brown (10YR 5/6) loam; few medium distinct brown (10YR 5/3) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; few fine tubular pores; common faint brown clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt3—28 to 33 inches; yellowish brown (10YR 5/6) fine sandy loam; few medium distinct brown (10YR 5/3) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; few fine tubular pores; common faint brown clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt4—33 to 42 inches; yellowish brown (10YR 5/4) fine sandy loam; few medium faint brown and few medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; few fine tubular pores; few faint brown clay films on faces of peds; strongly acid; clear smooth boundary.

BC1—42 to 55 inches; yellowish brown (10YR 5/4) fine sandy loam; common strong brown (7.5YR 5/8) streaks; weak very coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; few fine tubular pores; few faint clay films and silt coatings on faces of peds; 15 to 30 percent brittleness; common dark concretions; strongly acid; gradual smooth boundary.

BC2—55 to 72 inches; yellowish brown (10YR 5/4) fine sandy loam; weak very coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; few fine tubular pores; few faint clay films and silt coatings on faces of peds; 20 to 40 percent brittleness; strongly acid; gradual smooth boundary.

C—72 to 89 inches; yellowish brown (10YR 5/4) sandy loam; few fine distinct light brownish gray (10YR 6/2) and few fine faint yellowish brown mottles; massive; firm; strongly acid.

The solum is 30 to 60 inches or more in thickness. Depth to bedrock is more than 5 feet. Rock fragments of sandstone, siltstone, and shale range from 0 to 15 percent in the Ap horizon, 0 to 30 percent in the Bt horizon, and 0 to 35 percent in the BC and C horizons. In unlimed areas reaction is extremely acid to strongly acid.

The Ap horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 8. It is sandy clay loam, sandy loam, loam, fine sandy loam, or silt loam.

The BC and C horizons have colors and textures similar to those in the Bt horizon. The C horizon is mottled in shades of brown and gray.

Bethesda Series

The Bethesda series consists of very deep, well drained soils formed in acid regolith from surface coal mining. Permeability is moderately slow. These soils are on ridgetops, benches, and mountainsides. Slopes range from 0 to 70 percent. Bethesda soils are loamy-skeletal, mixed, acid, mesic Typic Udorthents.

Bethesda soils are on the same landscape as Dekalb, Fairpoint, Fedscreek, Gilpin, Hazleton, Kimper, Marrowbone, and Shelocta soils. Dekalb, Gilpin, and Marrowbone soils are moderately deep. Dekalb and Marrowbone soils have a cambic horizon. Gilpin soils have an argillic horizon. Fairpoint soils are nonacid. Gilpin, Kimper, and Shelocta soils are fine-loamy. Marrowbone and Fedscreek soils are coarse-loamy. Hazleton soils have a cambic horizon.

Typical pedon of Bethesda channery loam, in an area of Fairpoint-Bethesda complex, 0 to 6 percent slopes; in Floyd County, about 2.3 miles east of Dewey Dam, 1 mile southwest of confluence of Sycamore Creek with the Right Fork of Daniels Creek; in the Lancer Quadrangle:

Ap—0 to 5 inches; yellowish brown (10YR 5/4) channery loam; weak fine granular structure; very friable; many fine and medium, and few coarse roots; 15 percent sandstone channers; slightly acid; clear wavy boundary.

C1—5 to 17 inches; dark brown (10YR 4/3) very channery loam; many medium distinct gray (10YR 5/1) mottles; massive; firm; many fine roots; 40 percent sandstone and shale channers; extremely acid; gradual smooth boundary.

C2—17 to 27 inches; dark brown (10YR 4/3) very channery loam; many medium distinct gray (10YR 5/1) mottles; massive; friable; 40 percent sandstone and shale channers; 5 percent coal fragments; extremely acid; gradual smooth boundary.

C3—27 to 62 inches; dark grayish brown (10YR 4/2) extremely channery loam; massive; friable; 50 percent sandstone and shale channers; 15 percent coal fragments; extremely acid.

Depth to bedrock is more than 5 feet. Rock fragments of sandstone, shale, siltstone, and coal range from 15 to 80 percent, but average 35 percent or more in the 10- to 40-inch particle-size control section. Reaction is extremely acid to strongly acid, except where the surface layer has been reclaimed.

The Ap horizon has hue of 7.5YR to 5Y, value of 3 to 6, and chroma of 1 to 8, or is neutral with value of 3 to 6.

The C horizon has hue 7.5YR to 5Y, value of 3 to 6, and chroma of 1 to 8, or is neutral with value of 3 to 6. The fine earth is silty clay loam, silt loam, or loam.

Chavies Series

The Chavies series consists of very deep, well drained soils that formed in mixed alluvium derived from sandstone, siltstone, and shale. Permeability is moderately rapid. These soils are on stream terraces. Slopes range from 2 to 6 percent. Chavies soils are coarse-loamy, mixed, mesic Ultic Hapludalfs.

Chavies soils are on the same landscape as Allegheny, Cotaco, Knowlton, and Nelse soils. Allegheny soils are fine-loamy. Cotaco soils are fine-loamy and are moderately well drained or somewhat poorly drained. Knowlton soils are fine-loamy and are poorly drained. Nelse soils have strata of coarser material and are on steeper slopes.

Typical pedon of Chavies fine sandy loam, 2 to 6 percent slopes, rarely flooded; in Johnson County, about 0.75 mile southeast of Thelma, 300 feet west of the Levisa Fork of the Big Sandy River and 2,500 feet east of the Paintsville Golf Course; in the Paintsville Quadrangle:

Figure 12.—Typical pedon of Allegheny loam, 2 to 6 percent slopes, rarely flooded.

Ap—0 to 10 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; slightly acid; clear smooth boundary.

Bt1—10 to 19 inches; dark yellowish brown (10YR 4/6) fine sandy loam; moderate medium subangular blocky structure; firm; common fine and medium roots; common fine tubular pores; few faint clay films on faces of peds and bridging between sand grains; slightly acid; gradual smooth boundary.

Bt2—19 to 29 inches; dark yellowish brown (10YR 4/6) fine sandy loam; moderate medium subangular blocky structure; few fine roots; common fine tubular pores; few fine faint clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt3—29 to 39 inches; yellowish brown (10YR 5/6) fine sandy loam; few medium distinct brown (10YR 5/3) mottles; weak medium subangular blocky

structure; firm; few fine tubular pores; few fine faint clay films on faces of peds; very strongly acid; gradual smooth boundary.

BC—39 to 64 inches; yellowish brown (10YR 5/6) sandy loam; few medium distinct brown (10YR 5/3) and strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine tubular pores; very strongly acid.

The solum is 30 to 60 inches or more in thickness. Depth to bedrock is more than 5 feet. Rock fragments of sandstone or quartzitic pebbles range to 15 percent in the solum. In unlimed areas reaction is very strongly acid to medium acid.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 or 4.

The Bt horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 3 to 6. It is silt loam, fine sandy loam, or loam. Some pedons have mottles in shades of brown in the lower part.

Some pedons have BC and C horizons that have colors like those in the Bt horizon. In some pedons they are mottled in shades of brown and gray. Texture is like that in the Bt horizon, but includes sandy loam or its gravelly analog, or the horizons are stratified.

Cotaco Series

The Cotaco series consists of very deep, moderately well drained or somewhat poorly drained soils that formed in mixed alluvium derived from sandstone, siltstone, and shale. Permeability is moderate. These soils are on stream terraces. Slopes range from 0 to 4 percent. Cotaco soils are fine-loamy, mixed, mesic Aquic Hapludults.

Cotaco soils are on the same landscape as Allegheny, Chavies, and Knowlton soils. Allegheny soils are well drained. Chavies soils are coarse-loamy and well drained. Knowlton soils are fine-silty and poorly drained.

Typical pedon of Cotaco loam, rarely flooded; in Johnson County, 0.5 mile north of the Post Office in River, on Kentucky Highway 581, 600 feet east of Jenny Wiley grave site; in the Offutt Quadrangle:

Ap—0 to 6 inches; dark brown (10YR 4/3) loam; moderate fine granular structure; friable; many fine and medium roots; 2 percent sandstone pebbles; strongly acid; clear smooth boundary.

BA—6 to 11 inches; dark brown (10YR 4/3) loam; few fine faint brown mottles; moderate medium subangular blocky structure; friable; common fine roots; 2 percent sandstone pebbles; strongly acid; gradual smooth boundary.

Bt1—11 to 18 inches; brown (10YR 5/3) loam; common medium distinct yellowish brown (10YR 5/6) and many medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; few faint clay films on faces of peds; few fine roots; 3 percent sandstone pebbles; strongly acid; gradual smooth boundary.

Bt2—18 to 31 inches; mottled grayish brown (2.5Y 5/2) and strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; firm; few faint clay films on faces of peds; few fine roots; 5 percent sandstone pebbles; strongly acid; gradual wavy boundary.

C—31 to 62 inches; mottled light brownish gray (2.5Y 6/2) and strong brown (7.5YR 4/6) loam; massive; firm; few fine roots; 5 percent sandstone pebbles; very strongly acid.

The solum is 30 to 60 inches thick. Depth to bedrock is more than 5 feet. Rock fragments of sandstone, siltstone, and shale range from 2 to 10 percent in the solum and from 2 to 15 percent in the C horizon. Reaction is extremely acid to strongly acid.

The Ap and BA horizons have hue of 10YR, value of 4 to 6, and chroma of 2 to 4.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is silt loam, loam, clay loam, or sandy clay loam. It is mottled in shades of gray, brown, and red.

Some pedons have a BC horizon that has colors and textures like those in the Bt horizon. In some pedons the lower part of the Bt or BC horizon is mottled or has matrix colors in shades of gray.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 8, and chroma of 1 to 8 or is neutral and has value of 4 to 8. In some pedons it is mottled in the same colors without a dominant hue in the matrix. It is silt loam, loam, clay loam, or sandy clay loam.

Dekalb Series

The Dekalb series consists of moderately deep, well drained soils that formed in loamy residuum weathered from sandstone. Permeability is moderately rapid or rapid. These soils are on upper mountainsides, noses, and crests. Slopes range from 20 to 80 percent. Dekalb soils are loamy-skeletal, mixed, mesic Typic Dystrochrepts.

Dekalb soils are on the same landscape as Bethesda, Fairpoint, Fedscreek, Gilpin, Hazleton, Kimper, Marrowbone, Myra, Sharondale, and Shelocta soils. Bethesda, Fairpoint, and Myra soils formed in the spoil of strip mines and are very deep. Fedscreek, Hazleton, Kimper, Sharondale, and Shelocta soils are deep and very deep. Fedscreek and Marrowbone soils

are coarse-loamy. Kimper soils are fine-loamy. Sharondale soils have a mollic epipedon. Shelocta and Gilpin soils are fine-loamy and have an argillic horizon.

Typical pedon of Dekalb sandy loam, in an area of Dekalb-Gilpin-Marrowbone complex, 20 to 80 percent slopes, very stony; in Floyd County, about 1.2 miles northwest of Beaver, 1,000 feet southeast of the Mud Creek Lookout Tower, 6,500 feet west of the confluence of Mitchel Branch with Mud Creek; in the McDowell Quadrangle:

A—0 to 2 inches; very dark grayish brown (10YR 3/2) sandy loam; weak fine granular structure; very friable; many fine and medium, and few coarse roots; 10 percent sandstone channers; very strongly acid; clear smooth boundary.

E—2 to 6 inches; light yellowish brown (10YR 6/4) channery sandy loam; weak fine granular structure; very friable; common fine and medium, and few coarse roots; 20 percent sandstone channers; very strongly acid; gradual smooth boundary.

Bw1—6 to 14 inches; brownish yellow (10YR 6/8) channery fine sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; 25 percent sandstone channers; very strongly acid; gradual smooth boundary.

Bw2—14 to 21 inches; brownish yellow (10YR 6/8) very channery sandy loam; weak medium subangular blocky structure; friable; few fine, medium, and coarse roots; 45 percent sandstone channers; very strongly acid; gradual smooth boundary.

BC—21 to 27 inches; brownish yellow (10YR 6/8); extremely channery sandy loam; weak medium subangular blocky structure; very friable; few fine, medium, and coarse roots; 70 percent sandstone channers; very strongly acid; abrupt smooth boundary.

R—27 inches; gray sandstone.

The solum thickness and depth to bedrock are 20 to 40 inches. Rock fragments of sandstone, 1 to 10 inches in length, range from 10 to 60 percent in individual horizons and from 35 to 75 percent in the particle-size control section. Reaction is extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 1 to 4.

The Bw and BC horizons have hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 4 to 8. Texture of the fine earth is loam, fine sandy loam, or sandy loam.

Fairpoint Series

The Fairpoint series consists of very deep, well drained soils formed in medium acid to neutral regolith from surface coal mining. Permeability is moderately slow. These soils are on ridgetops, benches, and mountainsides. Slopes range from 0 to 70 percent. Fairpoint soils are loamy-skeletal, mixed, nonacid, mesic Typic Udorthents.

Fairpoint soils are on the same landscape as Bethesda, Dekalb, Fedscreek, Gilpin, Hazleton, Kimper, Marrowbone, and Shelocta soils. Bethesda soils are acid. Dekalb, Gilpin, and Marrowbone soils are moderately deep. Gilpin, Kimper, and Shelocta soils are fine-loamy. Marrowbone and Fedscreek soils are coarse-loamy. Hazleton soils have a cambic horizon.

Typical pedon of Fairpoint channery loam, in an area of Fairpoint-Bethesda complex, 30 to 70 percent slopes, stony; in Johnson County, about 1.2 miles southwest of Winifred, 5,000 feet northwest of the junction of Kentucky Highways 1092 and 1542; in the Sitka Quadrangle:

Ap—0 to 4 inches; brownish yellow (10YR 6/6) channery loam; many medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure parting to weak fine granular; friable; many fine and medium roots; 20 percent sandstone and siltstone channers; medium acid; gradual wavy boundary.

C1—4 to 10 inches; mottled brownish yellow (10YR 6/6) and light brownish gray (10YR 6/2) very channery loam; massive; firm; many fine and medium roots; 45 percent shale and siltstone channers; 5 percent coal fragments; neutral; gradual wavy boundary.

C2—10 to 22 inches; mottled brownish yellow (10YR 6/6) and light brownish gray (10YR 6/2) very channery loam; massive; firm; 40 percent shale and siltstone channers; 10 percent coal fragments; slightly acid; gradual wavy boundary.

C3—22 to 36 inches; mottled brownish yellow (10YR 6/6) and grayish brown (10YR 5/2) very channery loam; massive; firm; 40 percent shale and siltstone channers; 10 percent coal fragments; slightly acid; gradual smooth boundary.

C4—36 to 62 inches; dark grayish brown (2.5Y 4/2) extremely channery silt loam; 65 percent shale and siltstone channers; medium acid.

Depth to bedrock is more than 5 feet. Rock fragments of shale, siltstone, sandstone, and coal range from 15 to 60 percent, but average 35 percent or more in the 10- to 40-inch particle-size control

section. Reaction is medium acid to neutral, except for subsurface horizons that are strongly acid to mildly alkaline.

The Ap horizon has hue of 7.5YR to 5Y, value of 3 to 6, and chroma of 1 to 6, or is neutral and has value of 3 to 6.

The C horizon has hue of 7.5YR to 5Y, value of 3 to 6, and chroma of 1 to 8, or is neutral and has value of 3 to 6. The fine earth is silty clay loam, silt loam, or loam.

Fedscreek Series

The Fedscreek series consists of deep and very deep, well drained soils formed in loamy colluvium weathered from sandstone, siltstone, and shale (fig. 13). Permeability is moderately rapid in the solum and moderate or moderately rapid in the substratum. These soils are on the upper, middle, and lower mountainsides and on the upper, middle, and lower side slopes of foothills. They are also on benches and in coves. Slopes range from 20 to 80 percent. Fedscreek soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Fedscreek soils are on the same landscape as Bethesda, Dekalb, Fairpoint, Gilpin, Hazleton, Kimper, Marrowbone, Sharondale, and Shelocta soils. Dekalb, Gilpin, and Marrowbone soils are moderately deep. Dekalb, Bethesda, and Fairpoint soils are loamy-skeletal. Gilpin soils are fine-loamy. Bethesda and Fairpoint soils formed in strip mine spoil. Kimper soils are fine-loamy and have an umbric epipedon. Sharondale soils are loamy-skeletal and have a mollic epipedon. Hazleton soils are loamy-skeletal. Shelocta soils are fine-loamy and have an argillic horizon.

Typical pedon of Fedscreek fine sandy loam, in an area of Hazleton-Fedscreek-Shelocta complex, 30 to 70 percent slopes, very stony; in Johnson County, about 0.5 mile northwest of Hargis at the head of Little Mine Fork Creek, 1,700 feet north of the Magoffin County line; in the Oil Springs Quadrangle:

Oi—1 inch to 0; partly decomposed hardwood leaf litter.

A—0 to 5 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; friable; many fine and medium roots; 10 percent sandstone gravel; strongly acid; gradual smooth boundary.

Bw1—5 to 12 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; firm; many fine and medium, and few coarse roots; common fine tubular pores; 10 percent sandstone gravel; very strongly acid; gradual smooth boundary.

Bw2—12 to 27 inches; strong brown (7.5YR 4/6) loam; moderate medium subangular blocky structure; firm; common fine and medium, and few coarse roots; many fine tubular pores; 10 percent sandstone gravel; strongly acid; gradual smooth boundary.

Bw3—27 to 36 inches; strong brown (7.5 YR 5/6) channery loam; common medium distinct dark yellowish brown (10YR 3/6) mottles; moderate medium subangular blocky structure; firm; few fine, medium, and coarse roots; common fine tubular pores; 25 percent sandstone channers; very strongly acid; gradual smooth boundary.

Bw4—36 to 48 inches; strong brown (7.5YR 5/6) very channery fine sandy loam; moderate medium subangular blocky structure; firm; few fine and medium roots; few fine tubular pores; few faint silt coatings on faces of peds; 35 percent sandstone channers; strongly acid; clear smooth boundary.

BC—48 to 63 inches; yellowish brown (10YR 5/8) very channery fine sandy loam; weak medium subangular blocky structure; firm; 55 percent sandstone channers; medium acid; abrupt smooth boundary.

R—63 inches; fractured sandstone, siltstone, and shale.

The solum is 40 to 72 inches thick. Depth to bedrock is more than 40 inches. Rock fragments of sandstone and siltstone range from 5 to 60 percent in individual horizons, but the 10- to 40-inch particle-size control section averages less than 35 percent. Reaction is very strongly acid to medium acid.

The A horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 4.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is sandy loam, loam, silt loam, or their gravelly, channery, or very channery analogs. Some pedons have mottles in shades of brown, yellow, and red and, in the lower part, in shades of gray.

The BC horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is sandy loam, fine sandy loam, loam, clay loam, silt loam, silty clay loam, or their gravelly, channery, or very channery analogs. In some pedons it is mottled in shades of brown, yellow, red, or gray.

Gilpin Series

The Gilpin series consists of moderately deep, well drained soils that formed in loamy residuum weathered from interbedded shale, siltstone, and sandstone. Permeability is moderate. These soils are

on mountainsides, side slopes of foothills, noses, crests, and saddles. Slopes range from 12 to 80 percent. Gilpin soils are fine-loamy, mixed, mesic Typic Hapludults.

Gilpin soils are on the same landscape as Bethesda, Dekalb, Fairpoint, Fedscreek, Kimper, Marrowbone, Myra, Rayne, and Shelocta soils. Bethesda, Dekalb, Fairpoint, and Myra soils are loamy-skeletal. Bethesda, Fairpoint, and Myra soils formed in strip mine spoil and are very deep. Marrowbone soils are coarse-loamy. Fedscreek soils are deep and very deep and coarse-loamy. Shelocta, Kimper, and Rayne soils are deep and very deep.

Typical pedon of Gilpin loam, in an area of Gilpin-Fedscreek-Marrowbone complex, 20 to 60 percent slopes; in Johnson County, about 1.5 miles north of Hargus, 4,300 feet east of Little Mine Fork School; in the Oil Springs Quadrangle:

Ap—0 to 5 inches; brown (10YR 5/3) loam; weak medium subangular blocky structure parting to weak fine granular; friable; many fine and medium and few coarse roots; slightly acid; clear smooth boundary.

Bt1—5 to 11 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; firm; common fine and medium roots; common fine tubular pores; common faint clay films on faces of peds; 10 percent shale channers; extremely acid; gradual smooth boundary.

Bt2—11 to 18 inches; yellowish brown (10YR 5/6) loam; common fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; common fine and medium and few coarse roots; common fine tubular pores; common faint clay films on faces of peds; 12 percent shale channers; extremely acid; gradual smooth boundary.

C—18 to 28 inches; yellowish brown (10YR 5/4) very channery loam, massive; friable; common fine roots; 48 percent shale channers; extremely acid; clear smooth boundary.

R—28 inches; interbedded shale and siltstone.

The solum is 18 to 36 inches thick. Depth to bedrock is 20 to 40 inches. Rock fragments of shale, siltstone, and sandstone range from 5 to 40 percent in the A and Bt horizons and from 30 to 60 percent in the C horizon. In unlimed areas, reaction is extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 8. It is silt loam, loam, silty clay loam, or their channery or very channery analogs.

The C horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 6. It is silt loam, loam, silty clay loam, or their very channery or extremely channery analogs.

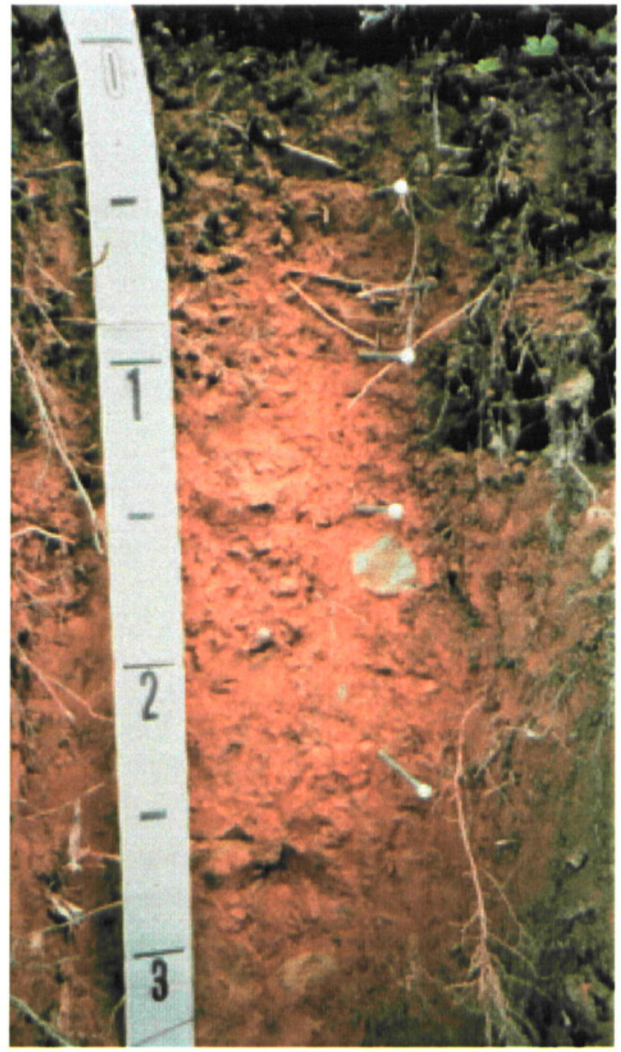


Figure 13.—Typical pedon of Fedscreek fine sandy loam, in an area of Hazleton-Fedscreek-Shelocta complex, 30 to 70 percent slopes, very stony.

Grigsby Series

The Grigsby series consists of very deep, well drained soils that formed in mixed alluvium derived from sandstone, siltstone, and shale. Permeability is moderate or moderately rapid. These soils are on flood plains. Slopes range from 0 to 4 percent. Grigsby soils

are coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts.

Grigsby soils are on the same landscape as Allegheny, Nelse, Potomac, Shelocta, and Stokly soils. Allegheny soils are in a fine-loamy family. Nelse soils have strata of coarser material and are on steeper slopes. Potomac soils are sandy-skeletal. Shelocta soils are on colluvial side slopes and are fine-loamy. Stokly soils are somewhat poorly drained.

Typical pedon of Grigsby fine sandy loam, occasionally flooded; in Johnson County, about 0.75 miles northeast of Dobson on Jennys Creek, 2,200 feet northeast of confluence of Mill and Jennys Creeks, 200 feet west of Kentucky Highway 825; in the Ivyton Quadrangle:

Ap—0 to 5 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; medium acid; clear smooth boundary.

Bw1—5 to 14 inches; dark yellowish brown (10YR 4/6) fine sandy loam; weak medium subangular blocky structure parting to weak fine granular; friable; few fine roots; slightly acid; gradual smooth boundary.

Bw2—14 to 24 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure parting to weak fine granular; very friable; few fine roots; slightly acid; gradual smooth boundary.

Bw3—24 to 42 inches; dark yellowish brown (10YR 4/6) fine sandy loam; weak medium subangular blocky structure parting to weak fine granular; very friable; few fine roots; medium acid; gradual smooth boundary.

C—42 to 62 inches; dark yellowish brown (10YR 4/6) stratified sandy loam and fine sandy loam; weak medium subangular blocky structure; very friable; slightly acid.

The solum is 30 to 50 inches thick. Depth to bedrock is more than 5 feet. Rock fragments, mostly pebbles of sandstone, siltstone, and shale, range from 0 to 15 percent in the solum and from 0 to 60 percent in the C horizon. Reaction is medium acid to neutral in the solum and strongly acid to neutral in the C horizon.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8. It is loam, fine sandy loam, or sandy loam.

The C horizon has colors similar to those of the Bw horizon. It is stratified loam, fine sandy loam, sandy loam, loamy fine sand, or their gravelly or very gravelly analogs.

Hazleton Series

The Hazleton series consists of deep and very deep, well drained soils that formed in loamy colluvium weathered from sandstone, siltstone, and shale. Permeability is moderately rapid or rapid. These soils are on middle and lower mountainsides, on benches, and in coves. Slopes range from 30 to 80 percent. Hazleton soils are loamy-skeletal, mixed, mesic Typic Dystrochrepts.

Hazleton soils are on the same landscape as Bethesda, Dekalb, Fairpoint, Fedscreek, Kimper, Marrowbone, Myra, Sharondale, and Shelocta soils. Fedscreek and Marrowbone soils are coarse-loamy. Kimper and Shelocta soils are fine-loamy. Shelocta soils have an argillic horizon. Dekalb and Marrowbone soils are moderately deep. Sharondale soils have a mollic epipedon. Bethesda, Fairpoint, and Myra soils formed in strip mine spoil and do not have a cambic horizon.

Typical pedon of Hazleton fine sandy loam, in an area of Hazleton-Fedscreek-Marrowbone complex, 30 to 80 percent slopes, very stony; in Johnson County, about 2 miles south-southeast of Boons Camp, 1 mile northwest of Spring Knob Lookout Tower, 1,200 feet north of Middle Fork Road; in the Offutt Quadrangle:

Oi—1 inch to 0; partly decomposed hardwood leaf litter.

A—0 to 5 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; 5 percent sandstone channers; very strongly acid; clear smooth boundary.

Bw1—5 to 13 inches; light yellowish brown (10YR 6/4) channery sandy loam; weak medium subangular blocky structure; friable; common fine and medium, and few coarse roots; many fine tubular pores; 15 percent sandstone channers; strongly acid; gradual smooth boundary.

Bw2—13 to 28 inches; brownish yellow (10YR 6/6) very channery sandy loam; moderate medium subangular blocky structure; firm; common fine and medium roots; many fine tubular pores; 40 percent sandstone channers and flagstones; very strongly acid; gradual smooth boundary.

Bw3—28 to 38 inches; yellowish brown (10YR 5/6) very flaggy fine sandy loam; moderate medium subangular blocky structure; firm; few fine roots; common fine tubular pores; 55 percent sandstone flagstones and channers; very strongly acid; gradual smooth boundary.

Bw4—38 to 50 inches; yellowish brown (10YR 5/6)

very flaggy fine sandy loam; moderate medium subangular blocky structure; firm; few fine roots; common fine tubular pores; 55 percent sandstone flagstones and channers; very strongly acid; gradual smooth boundary.

C—50 to 62 inches; brownish yellow (10YR 6/6) extremely channery fine sandy loam; massive; firm; 70 percent sandstone channers and flagstones; very strongly acid; gradual smooth boundary.

IICr—62 to 67 inches; interbedded shale, sandstone, and siltstone.

The solum is 25 to 50 inches thick. Depth to bedrock is 40 to 80 inches. Sandstone fragments, 0.1 to 15 inches in length, range from 5 to 70 percent in individual horizons, but average 35 percent or more in the 10- to 40-inch particle-size control section. Reaction is extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 4.

Some pedons have an E horizon that has hue of 10YR, value of 4 or 5, and chroma of 1 to 4. It is similar in texture to the upper part of the Bw horizon.

The Bw horizon has hue of 10YR and 7.5YR, value of 3 to 6, and chroma of 3 to 8. The fine earth is sandy loam or loam in the upper part and loam, fine sandy loam, sandy loam, and loamy sand in the lower part.

The C horizon has hue of 5YR to 2.5Y, value of 3 to 6, and chroma of 3 to 8. The fine earth is loam, fine sandy loam, and sandy loam.

Kimper Series

The Kimper series consists of deep and very deep, well drained soils that formed in loamy colluvium from weathered sandstone, siltstone, and shale. Permeability is moderate or moderately rapid. These soils are on the north- and east-facing, lower mountainsides, on benches, and in coves. Slopes range from 30 to 80 percent. Kimper soils are fine-loamy, mixed, mesic Umbric Dystrochrepts.

Kimper soils are on the same landscape as Bethesda, Dekalb, Fairpoint, Fedscreek, Gilpin, Hazleton, Marrowbone, Myra, and Sharondale soils. Gilpin and Marrowbone soils are moderately deep. Marrowbone and Fedscreek soils are coarse-loamy and are neither as thick nor as dark in the surface layer. Sharondale soils are loamy-skeletal and have a mollic epipedon. Bethesda, Fairpoint, Hazleton, and Myra soils are loamy-skeletal. Bethesda, Fairpoint, and Myra soils formed in strip mine spoil.

Typical pedon of Kimper loam, in an area of Hazleton-Fedscreek-Kimper complex, 30 to 80 percent slopes, very stony; in Johnson County, about 2.5 miles south of Whitehouse, 2.2 miles northeast of the intersection of Bee Branch Road and Kentucky Highway 40; in the Offutt Quadrangle:

Oi—1.5 inches to 0; partly decomposed hardwood leaf litter.

A—0 to 6 inches; dark brown (10YR 3/3), (10YR 5/3) dry, loam; weak fine granular structure; very friable; many fine and medium, and few coarse roots; 5 percent sandstone channers; medium acid; clear smooth boundary.

BA—6 to 11 inches; dark brown (10YR 4/3) silt loam; weak medium subangular blocky structure parting to moderate coarse granular; very friable; many fine and medium roots; 10 percent sandstone channers; strongly acid; clear wavy boundary.

Bw1—11 to 19 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; common fine roots; common fine tubular pores; 10 percent sandstone channers; strongly acid; clear smooth boundary.

Bw2—19 to 27 inches; yellowish brown (10YR 5/4) channery silt loam; moderate medium subangular blocky structure; friable; few fine and medium roots; common fine tubular pores; 20 percent sandstone channers; strongly acid; gradual smooth boundary.

Bw3—27 to 44 inches; yellowish brown (10YR 5/6) very channery loam; moderate medium subangular blocky structure; friable; few fine roots; few fine tubular pores; 40 percent sandstone channers; strongly acid; gradual smooth boundary.

Bw4—44 to 54 inches; yellowish brown (10YR 5/6) very channery loam; common medium distinct grayish brown (10YR 5/2) and yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; few fine tubular pores; 45 percent sandstone channers; strongly acid; gradual smooth boundary.

BC—54 to 63 inches; yellowish brown (10YR 5/6) very channery loam; common medium distinct grayish brown (10YR 5/2) and strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; firm; few fine tubular pores; 50 percent sandstone channers; strongly acid; gradual smooth boundary.

C—63 to 66 inches; grayish brown (10YR 5/2) and strong brown (7.5YR 5/8) very channery loam; structureless; firm; 75 percent sandstone and shale channers; strongly acid; abrupt smooth boundary.

R—66 inches; interbedded shale, sandstone, and siltstone.

Solum thickness and depth to bedrock are 40 to more than 60 inches. Rock fragments of sandstone, siltstone, or shale range from 5 to 60 percent in individual horizons, but the 10- to 40-inch particle-size control section averages less than 35 percent. Reaction is extremely acid to neutral in the A horizon and very strongly acid to medium acid in the Bw, BC, and C horizons.

The A and BA horizons have hue of 7.5YR to 2.5 Y, value of 2 to 4, and chroma of 1 to 4.

The Bw horizon has hue of 7.5 YR to 2.5 YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam, loam, sandy loam, silty clay loam, clay loam, or their channery or very channery analogs.

The BC and C horizons have hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 8. It is silt loam, silty clay loam, loam, clay loam, fine sandy loam, sandy loam, or their channery, very channery, flaggy, or very flaggy analogs. Some pedons are mottled in shades of brown, yellow, red, or gray.

Knowlton Series

The Knowlton series consists of very deep, poorly drained soils that formed in mixed alluvium derived from shale, siltstone, and sandstone (fig. 14). Permeability is slow. These soils are on stream terraces. Slopes range from 0 to 2 percent. Knowlton soils are fine-silty, mixed, mesic Typic Ochraquults.

Knowlton soils are on the same landscape as Allegheny, Chavies, and Cotaco soils. Allegheny soils are fine-loamy and are well drained. Chavies soils are coarse-loamy and are well drained. Cotaco soils are fine-loamy and are moderately well drained to somewhat poorly drained.

Typical pedon of Knowlton silt loam, rarely flooded; in Floyd County, about 1.2 miles north of West Prestonsburg, 400 feet west of Kentucky Highway 23 and 300 feet south of the radio tower on the campus of Prestonsburg Community College; in the Prestonsburg Quadrangle:

Ap—0 to 8 inches; brown (10YR 5/3) silt loam; moderate medium granular structure; friable; many fine and medium roots; very strongly acid; clear smooth boundary.

Btg1—8 to 15 inches; grayish brown (2.5Y 5/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6) mottles; weak moderate subangular blocky structure; friable; common fine and medium roots; common fine tubular pores; few faint clay films on faces of peds; strongly acid; gradual smooth boundary.

Btg2—15 to 27 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine and medium roots; common fine tubular pores; common faint clay films on faces of peds; strongly acid; gradual smooth boundary.

Btg3—27 to 36 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common fine tubular pores; common faint clay films on faces of peds; common dark concretions; strongly acid; clear smooth boundary.

Btg4—36 to 50 inches; light olive gray (5Y 6/2) silty clay loam; many common distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; weak very coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common fine tubular pores; common faint clay films on faces of peds; common dark concretions; strongly acid; clear smooth boundary.

Btg5—50 to 59 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; weak very coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common fine tubular pores; few faint clay films on faces of peds; common dark concretions; strongly acid; clear smooth boundary.

BCg—59 to 71 inches; light brownish gray (2.5Y 6/2) and grayish brown (2.5Y 5/2) silty clay loam; medium distinct strong brown (7.5YR 5/8) mottles; weak very coarse prismatic structure parting to weak medium subangular blocky; firm; common fine tubular pores; few faint clay films on faces of peds; many dark concretions; medium acid.

The solum is 40 to 60 inches or more in thickness. Depth to bedrock is more than 5 feet. Rock fragments of sandstone, siltstone, and shale range from 0 to 15 percent. Reaction is very strongly acid to neutral in the A horizon and very strongly acid to medium acid in the Btg and BCg horizons.

The Ap horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 4.

The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of brown and gray. Texture is silt loam, silty clay loam, loam, or clay loam.

The BCg horizon has the same range of color and texture as the Btg horizon.

Marrowbone Series

The Marrowbone series consists of moderately deep, well drained soils that formed in loamy residuum or colluvium weathered from sandstone and siltstone. Permeability is moderate or moderately rapid. These soils are on upper mountainsides, noses, and crests. Slopes range from 20 to 80 percent. Marrowbone soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Marrowbone soils are on the same landscape as Bethesda, Dekalb, Fairpoint, Fedscreek, Gilpin, Hazleton, Kimper, Myra, and Sharondale soils. Dekalb soils are loamy-skeletal. Gilpin soils are fine-loamy. Kimper soils are fine-loamy and very deep. Fedscreek soils are very deep. Sharondale, Bethesda, Fairpoint, Myra, and Hazleton soils are loamy-skeletal and very deep and deep. Bethesda, Fairpoint, and Myra soils formed in strip mine spoil.

Typical pedon of Marrowbone fine sandy loam, in an area of Hazleton-Fedscreek-Marrowbone complex, 30 to 80 percent slopes, very stony; in Johnson County, at the head of Chestnut Creek, 2.25 miles east-southeast of Whitehouse, 4,000 feet north of the Martin County line; in the Offutt Quadrangle:

Oi—1 inch to 0; partly decomposed hardwood leaf litter.

A—0 to 7 inches; dark brown (10YR 4/3) fine sandy loam; weak fine subangular blocky structure parting to moderate medium granular; friable; many fine and medium roots; 5 percent sandstone fragments; medium acid; gradual smooth boundary.

Bw1—7 to 13 inches; yellowish brown (10YR 5/6) fine sandy loam; moderate medium subangular blocky structure; firm; common fine and medium roots; many fine tubular pores; 7 percent sandstone channers; strongly acid; gradual smooth boundary.

Bw2—13 to 19 inches; brownish yellow (10YR 6/6) fine sandy loam; moderate medium subangular blocky structure; firm; common fine and medium roots; many fine tubular pores; few faint silt coatings on faces of peds; 10 percent sandstone channers; strongly acid; clear smooth boundary.

Bw3—19 to 27 inches; strong brown (7.5YR 5/6) fine sandy loam; moderate medium subangular blocky structure; firm; few fine and medium roots; common fine tubular pores; few faint silt coatings on faces of peds; 10 percent sandstone channers; very strongly acid; gradual smooth boundary.

Bw4—27 to 32 inches; brownish yellow (10YR 6/8) fine sandy loam; moderate medium subangular blocky structure; firm; few fine and medium roots; common fine tubular pores; few faint silt coatings on faces of peds; 10 percent sandstone channers; very strongly acid; abrupt wavy boundary.

C—32 to 37 inches; strong brown (7.5YR 5/8) very channery fine sandy loam; weak medium subangular blocky structure; firm; few fine tubular pores; 45 percent sandstone channers; very strongly acid; abrupt wavy boundary.

R—37 inches; gray sandstone.

The solum thickness and depth to bedrock are 20 to 40 inches. Rock fragments of sandstone and siltstone, 0.1 to 15 inches in length, range from 5 to 45 percent in individual horizons, but average less that 35 percent in the particle-size control section. Reaction is very strongly acid to medium acid.

The A horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 4.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is fine sandy loam, sandy loam, loam, or their channery or very channery analogs.

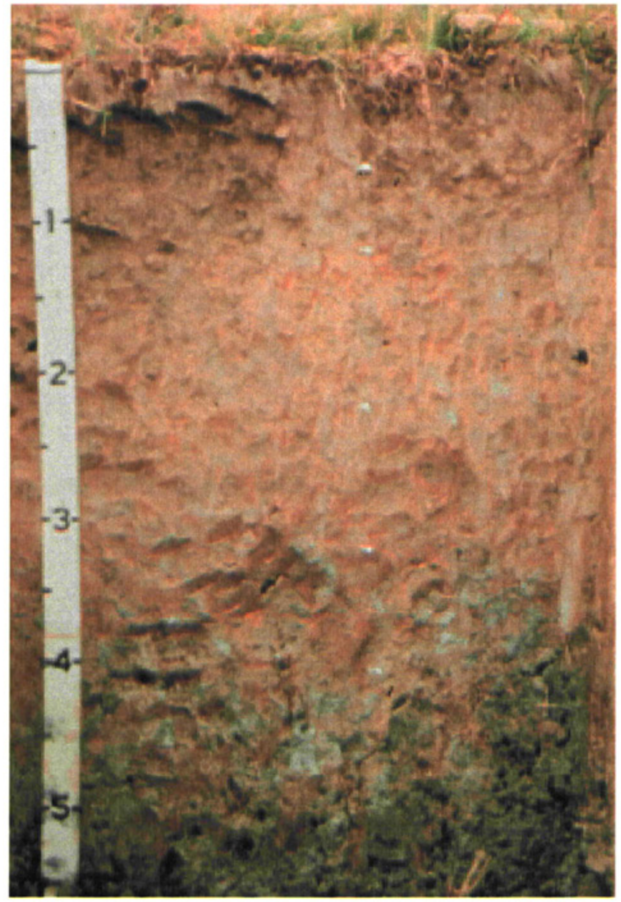


Figure 14.—Typical pedon of Knowlton silt loam, rarely flooded.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is fine sandy loam, sandy loam, loamy sand, loam, or their channery or very channery analogs. Some pedons are mottled in shades of brown, yellow, red, or gray.

Myra Series

The Myra Series consists of very deep, well drained soils formed in calcareous regolith from surface coal mining. Permeability is moderately slow or moderate. These soils are on ridgetops, benches, and mountainsides. Slopes range from 0 to 70 percent. Myra soils are loamy-skeletal, mixed (calcareous), mesic Typic Udorthents.

Myra soils are on the same landscape as Dekalb, Gilpin, Hazleton, Kimper, Marrowbone, and Sharondale soils. Dekalb, Gilpin, and Marrowbone soils are moderately deep. Dekalb and Marrowbone soils have a cambic horizon. Gilpin soils have an argillic horizon. Gilpin and Kimper soils are fine-loamy. Marrowbone and Fedscreek soils are coarse-loamy. Hazleton soils have a cambic horizon. Sharondale soils have a mollic epipedon and a cambic horizon.

Typical pedon of Myra very channery fine sandy loam, in an area of Myra very channery fine sandy loam, 30 to 70 percent slopes, stony; in Floyd County, about 1.25 miles southwest of Ivel, 2 miles west of Tram, at the head of Stratton Branch; in the Harold Quadrangle:

Ap—0 to 8 inches; grayish brown (2.5Y 5/2) very channery fine sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; 20 percent sandstone channers, 10 percent shale channers, and 10 percent coal fragments; moderately alkaline; very slightly effervescent; clear wavy boundary.

C1—8 to 18 inches; grayish brown (2.5Y 5/2) and dark brown (10YR 4/3) very channery loam; massive; friable; common fine and medium roots; 25 percent sandstone channers, 20 percent shale channers, and 10 percent coal fragments; moderately alkaline; very slightly effervescent; gradual wavy boundary.

C2—18 to 30 inches; dark brown (10YR 4/3) very channery loam; many medium faint yellowish brown mottles; massive; firm; few fine roots; 35 percent sandstone channers, 15 percent shale channers, and 5 percent coal fragments; moderately alkaline; very slightly effervescent; gradual wavy boundary.

C3—30 to 42 inches; brown (10YR 5/3) very channery loam; massive; firm few fine roots; 25 percent sandstone channers, 20 percent shale channers, and 5 percent coal fragments; moderately alkaline; very slightly effervescent; gradual wavy boundary.

C4—42 to 63 inches; dark grayish brown (2.5Y 4/2) very channery loam; massive; firm; 40 percent sandstone channers and 20 percent shale channers; moderately alkaline; very slightly effervescent.

Depth to bedrock is more than 5 feet. Rock fragments of shale, siltstone, sandstone, and coal range from 30 to 70 percent, but average 35 percent or more in the 10- to 40-inch particle-size control section. Reaction is slightly acid to moderately alkaline in the Ap horizon and moderately alkaline or mildly alkaline in the C horizon.

The Ap horizon has hue of 7.5YR to 2.5Y, value of 4 to 8, and chroma of 1 to 8, or is neutral and has value of 4 to 8.

The C horizon has hue of 5YR to 5Y, value of 2 to 8, and chroma of 1 to 8 or is neutral and has value of 2 to 8. The fine earth is silt loam, loam, or fine sandy loam and in some pedons silty clay loam or clay loam.

Nelse Series

The Nelse series consists of very deep, well drained soils that formed in recent alluvium derived from sandstone. Permeability is moderately rapid or rapid. These soils are on the banks of the Levisa Fork of the Big Sandy River and its major tributaries. Slopes range from 4 to 25 percent. Nelse soils are coarse-loamy, mixed, nonacid, mesic Mollic Udifluvents.

Nelse soils are on the same landscape as Allegheny, Chavies, Grigsby, and Stokly soils. Allegheny soils are fine-loamy and have an argillic horizon. Chavies soils have an argillic horizon. Grigsby soils do not have stratified, coarser material in the upper 40 inches of the profile. Stokly soils are somewhat poorly drained.

Typical pedon of Nelse loam, 4 to 25 percent slopes, frequently flooded; in Johnson County, about 1.2 miles south of West Van Lear on the bank of the Levisa Fork of Big Sandy River; 4,300 feet southeast of bridge on US 23 over Levisa Fork; in the Paintsville Quadrangle:

A—0 to 8 inches; dark brown (10YR 3/3), (10YR 5/3) dry, loam; dark yellowish brown loamy fine sand strata 0.3 to 1 inch thick; weak medium subangular blocky structure parting to weak fine granular; very friable; many fine and medium, and few coarse roots; 1 percent coal fragments; moderately alkaline; gradual smooth boundary.

C1—8 to 21 inches; brown (10YR 5/3) fine sandy

loam; weak medium subangular blocky structure; very friable; common dark brown (10YR 4/3) sand bedding planes; 2 percent coal fragments; moderately alkaline; gradual smooth boundary.

C2—21 to 39 inches; dark brown (10YR 4/3) fine sandy loam; massive; friable; common dark yellowish brown (10YR 4/4) sand bedding planes; 8 percent coal fragments; mildly alkaline; gradual smooth boundary.

C3—39 to 65 inches; dark grayish brown (10YR 4/2) loamy fine sand; massive; friable; common dark yellowish brown (10YR 4/4) fine sand bedding planes; 2 percent coal fragments; mildly alkaline; gradual smooth boundary.

C4—65 to 80 inches; dark brown (10YR 4/3) loamy fine sand; single grained; loose; mildly alkaline.

Depth to bedrock is 60 to 80 inches or more. Rounded or subrounded rock fragments 0.1 to 10 inches in diameter range from 0 to 15 percent. Coal fragments .01 to 3 inches in diameter range from 0 to 15 percent. Reaction is strongly acid to moderately alkaline.

The A horizon has hue of 2.5Y or 10YR, value of 2 to 5, and chroma of 2 to 4.

The C horizon has hue of 2.5Y or 10YR, value of 3 to 6, and chroma of 2 to 6. It is silt loam, loam, fine sandy loam, sandy loam, loamy fine sand, or loamy sand that generally is stratified with very fine to medium sand.

Potomac Series

The Potomac series consists of very deep, somewhat excessively drained soils that formed in coarse textured alluvium derived from sandstone (fig. 15). Permeability is moderate or moderately rapid in the surface layer and rapid or very rapid in the underlying layers. These soils are on flood plains. Slopes range from 2 to 4 percent. Potomac soils are sandy-skeletal, mixed, mesic Typic Udifluvents.

Potomac soils are on the same landscape as Grigsby, Shelocta, and Stokly soils. Grigsby and Stokly soils are coarse-loamy. Shelocta soils are on colluvial side slopes and are fine-loamy.

Typical pedon of Potomac sandy loam, in an area of Potomac-Shelocta-Grigsby complex, 2 to 15 percent slopes; in Floyd County, about 0.5 mile south of East McDowell on Frasure Fork, 3,000 feet north-northwest of Hall School; in the McDowell Quadrangle:

Ap—0 to 6 inches; dark yellowish brown (10YR 3/4), sandy loam; weak fine and medium granular structure; very friable; common fine and medium roots; 10 percent sandstone cobbles; slightly acid; gradual smooth boundary.

AC—6 to 11 inches; dark yellowish brown (10YR 3/4) sandy loam; weak medium subangular blocky structure; very friable; common fine and medium roots; 10 percent sandstone pebbles and cobbles; medium acid; gradual smooth boundary.

2C1—11 to 18 inches; dark yellowish brown (10YR 4/4) very cobbly loamy sand; single grained; loose; common fine roots; 40 percent sandstone cobbles and pebbles; slightly acid; gradual smooth boundary.

2C2—18 to 26 inches; dark yellowish brown (10YR 4/4) very cobbly loamy sand; single grained; loose; few fine roots; 45 percent sandstone cobbles and pebbles; moderately alkaline; clear smooth boundary.

2C3—26 to 62 inches; dark yellowish brown (10YR 4/4) extremely cobbly sand; single grained; loose; 70 percent sandstone cobbles and pebbles; neutral.

Depth to bedrock is more than 5 feet. Cobblestones and gravel dominantly of sandstone range from 0 to 50 percent in the Ap and AC horizons and from 35 to 70 percent in the 2C horizon. In some pedons coarse fragments range to 80 percent in the subhorizons of the 2C horizon. Reaction is strongly acid to mildly alkaline.

The Ap and AC horizons have hue of 10YR or 7.5YR and value and chroma of 2 to 4.

The 2C horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 or 4. The fine earth is loamy sand or sand. Some pedons have subhorizons of sandy loam.

Rayne Series

The Rayne series consists of deep and very deep, well drained soils that formed in residuum weathered from interbedded shale, siltstone, and fine grained sandstone. Permeability is moderate. These soils are on ridges of foothills in the northern part of Johnson County. Slopes range from 6 to 12 percent. Rayne soils are fine-loamy, mixed, mesic Typic Hapludults.

Rayne soils are on the same landscape as Gilpin and Shelocta soils. Gilpin soils are moderately deep. Shelocta soils formed in colluvium.

Typical pedon of Rayne loam, in an area of Rayne-Gilpin complex, 6 to 15 percent slopes; in Johnson County, about 0.25 mile south of Flat Gap, 1,000 feet southwest of the intersection of Kentucky Highways 1092 and 689, 2,800 feet south of the Flat Gap Elementary School; in the Redbush Quadrangle:

Ap—0 to 7 inches; dark yellowish brown (10YR 4/4) loam; weak fine granular structure; very friable; many fine and medium roots; neutral; clear smooth boundary.
BA—7 to 12 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; common fine and medium roots; few fine tubular pores; neutral; gradual smooth boundary.
Bt1—12 to 19 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; firm; few fine roots; few fine tubular pores; few faint clay films on faces of peds; slightly acid; gradual smooth boundary.
Bt2—19 to 31 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; firm; few fine roots; few fine tubular pores; common faint clay films on faces of peds; 5 percent shale channers; strongly acid; gradual smooth boundary.
Bt3—31 to 40 inches; yellowish brown (10YR 5/6) loam; few medium faint yellowish brown (10YR 5/8) and (10YR 5/4) mottles; weak medium subangular blocky structure; firm; few fine tubular pores; few faint clay films on faces of peds; strongly acid; gradual smooth boundary.
BC—40 to 53 inches; yellowish brown (10YR 5/8) loam; common medium faint yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; firm; few fine tubular pores; few faint clay films on faces of peds; 20 percent shale channers; strongly acid.
C1—53 to 63 inches; yellowish brown (10YR 5/8) silty clay loam; common medium faint yellowish brown (10YR 5/4) mottles; massive; firm; 25 percent shale channers; strongly acid; clear smooth boundary.
C2—63 to 72 inches; yellowish brown (10 YR 5/8) very channery silt loam; common medium faint yellowish brown (10YR 5/6) mottles; massive; 35 percent shale channers; many dark brown and black concretions; strongly acid.
Cr—72 to 75 inches; shale.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 40 inches. Rock fragments of shale, sandstone, and siltstone range from 0 to 40 percent in the solum and from 15 to 90 percent in the BC and C horizons. In unlimed areas reaction is very strongly acid or strongly acid.

The Ap and BA horizons have hue of 10YR, value of 3 to 5, and chroma of 2 to 4.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is loam, silt loam, silty clay loam, or their channery or very channery analogs.

The BC horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam, silt loam, silty clay loam, or their channery or very channery analogs.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 8, and chroma of 1 to 8. It is sandy loam, loam, silt loam, silty clay loam, or their channery, very channery, or extremely channery analogs.

Rigley Series

The Rigley series consists of very deep, well drained soils that formed in colluvium weathered from acid sandstone, siltstone, and shale. Permeability is moderately rapid. These soils are on side slopes and benches in the northern part of Johnson County. Slopes range from 30 to 70 percent. Rigley soils are coarse-loamy, mixed, mesic Typic Hapludults.

Rigley soils are on the same landscape as Shelocta soils and Rock outcrop. Shelocta soils are fine-loamy.

Typical pedon of Rigley fine sandy loam, in an area of Rigley-Rock outcrop complex, 30 to 70 percent slopes; in Johnson County, about 1 mile north of Flat Gap, 100 feet west of Kentucky Highway 689, and 600 feet south of the junction of Kentucky Highways 689 and 1624; in the Redbush Quadrangle:

Oi—1 inch to 0; decayed forest litter.
A1—0 to 2 inches; dark brown (10YR 3/3) fine sandy loam; weak fine granular structure; very friable; many fine, medium, and coarse roots; 5 percent sandstone channers; very strongly acid; gradual smooth boundary.
A2—2 to 5 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine granular structure; very friable; many fine, medium, and coarse roots; 5 percent sandstone channers; very strongly acid; gradual smooth boundary.
BA—5 to 14 inches; brownish yellow (10YR 6/6) sandy loam; weak medium subangular blocky structure; very friable; many fine, medium, and coarse roots; few fine tubular pores; 5 percent sandstone channers; very strongly acid; gradual smooth boundary.
Bt1—14 to 22 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable; common fine and medium, and few coarse roots; few fine tubular pores; few fine faint clay films on faces of peds and bridging between sand grains; 5 percent sandstone channers; very strongly acid; gradual smooth boundary.
Bt2—22 to 32 inches; yellowish brown (10YR 5/6) sandy loam; moderate medium subangular blocky structure; friable; few fine, medium, and coarse roots; few fine tubular pores; few fine faint clay films on faces of peds and bridging between sand

grains; 10 percent sandstone channers; very strongly acid; gradual smooth boundary.

Bt3—32 to 55 inches; brownish yellow (10YR 6/8) channery sandy loam; many, medium, distinct light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable; few fine and medium roots; few fine tubular pores; few fine faint clay films on faces of peds and bridging between sand grains; 20 percent sandstone channers; very strongly acid; gradual smooth boundary.

C—55 to 61 inches; brownish yellow (10YR 6/8) channery sandy loam; many medium, distinct light gray (10YR 7/2) mottles; massive; 20 percent sandstone channers; very strongly acid.

R—61 inches; sandstone.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 5 feet. Rock fragments of sandstone range from 5 to 35 percent in the solum and from 20 to 70 percent in the C horizon. Reaction is extremely acid to strongly acid, except in the A horizon, which is very strongly acid to neutral.

The A1 horizon has hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 2 or 3.

The A2 horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 2 to 4.

The BA horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 6. It is sandy loam.

The Bt horizon has hue of 10YR or 7.5 YR , value of 4 to 6, and chroma of 4 to 8. It is sandy loam, loam, or their channery analog. Some pedons have mottles in shades of brown and yellow and, in the lower part, in shades of gray.

The C horizon has colors like those in the Bt horizon. It is sandy loam, loam, sandy clay loam, or their channery, very channery, or extremely channery analogs.

Sharondale Series

The Sharondale series consists of very deep, well drained soils that formed in loamy colluvium weathered from sandstone, siltstone, and shale (fig. 16). Permeability is moderately rapid. These soils are on north- and east-facing lower and middle mountainsides, on benches, and in coves. Slopes range from 30 to 80 percent. Sharondale soils are loamy-skeletal, mixed, mesic Typic Hapludolls.

Sharondale soils are on the same landscape as Dekalb, Fedscreek, Hazleton, Kimper, Marrowbone, and Myra soils. Fedscreek and Hazleton soils have an ochric epipedon. Fedscreek soils are coarse-loamy. Kimper soils are fine-loamy. Dekalb and Marrowbone soils are moderately deep. Myra soils formed in strip mine spoil. Marrowbone soils are coarse-loamy.

Typical pedon of Sharondale channery loam, in an area of Sharondale-Hazleton-Kimper complex, 30 to 80 percent slopes, extremely stony; in Floyd County, about 1 mile north of Melvin, at the head of Riley Branch; in the Wheelwright Quadrangle:

Oi—2 inches to 0; partly decomposed hardwood leaf litter.

A—0 to 11 inches; very dark grayish brown (10YR

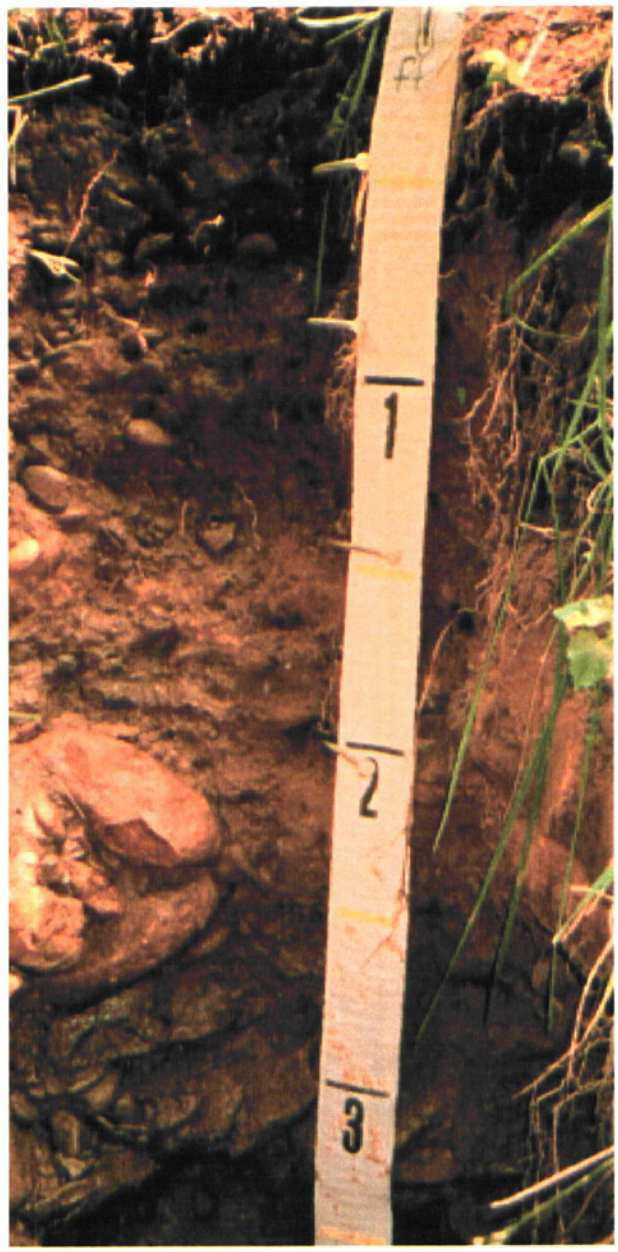


Figure 15.—Typical pedon of Potomac sandy loam, in an area of Potomac-Shelocta-Grigsby complex, 2 to 15 percent slopes.

3/2), (10YR 5/3) dry, channery loam; weak medium subangular blocky structure parting to weak medium granular; very friable; many fine and medium, and common coarse roots; 27 percent sandstone channers; slightly acid; clear smooth boundary.

AB—11 to 16 inches; dark brown (10YR 3/3) very channery loam; weak medium subangular blocky structure; friable; many fine and medium, and common coarse roots; 55 percent sandstone channers and flagstones; medium acid; clear smooth boundary.

Bw1—16 to 24 inches; dark brown (10YR 4/3) extremely flaggy loam; weak medium subangular blocky structure; friable; common fine and medium, and few coarse roots; 67 percent sandstone flagstones and channers; medium acid; clear smooth boundary.

Bw2—24 to 32 inches; dark yellowish brown (10YR 4/4) very channery loam; moderate medium subangular blocky structure; friable; common fine and medium roots; common fine tubular pores; 36 percent sandstone channers and flagstones; slightly acid; clear smooth boundary.

Bw3—32 to 43 inches; dark yellowish brown (10YR 4/4) very channery loam; moderate medium subangular blocky structure; firm; few fine and medium roots; common fine tubular pores; 39 percent sandstone channers and flagstones; slightly acid; clear wavy boundary.

Bw4—43 to 52 inches; brown (10YR 5/3) very channery loam; moderate medium subangular blocky structure; firm; few fine roots; many fine tubular pores; few faint silt coatings on faces of peds; 50 percent sandstone flagstones and channers; slightly acid; gradual smooth boundary.

BC—52 to 61 inches; yellowish brown (10YR 5/4) extremely flaggy fine sandy loam; weak medium subangular blocky structure; firm; few fine roots; few fine tubular pores; 66 percent sandstone flagstones and channers; slightly acid; clear smooth boundary.

C—61 to 78 inches; yellowish brown (10YR 5/4) very channery fine sandy loam; massive; firm; 50 percent sandstone channers and flagstones; slightly acid; clear smooth boundary.

The solum is 40 to 80 inches or more thick. Depth to bedrock is more than 5 feet. Rock fragments of sandstone, siltstone, and shale, 0.1 to 15 inches in length, range from 10 to 85 percent in individual horizons, but average 35 percent or more in the 10- to 40-inch particle-size control section. Reaction is strongly acid to neutral.

The A and AB horizons have hue of 10YR or 2.5Y, value of 2 or 3 moist, 4 or 5 dry, and chroma of 2 or 3 moist, 3 to 5 dry.

The Bw and BC horizons have hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 3 to 6. The fine earth is silt loam, loam, fine sandy loam, or sandy loam. Some pedons have mottles in shades of brown and yellow and, in the lower part, shades of gray.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 8. The fine earth is silt loam, loam, silty clay loam, clay loam, fine sandy loam, or sandy loam. Some pedons have mottles in shades of brown, yellow, or gray.

Shelocta Series

The Shelocta series consists of deep and very deep, well drained soils that formed in mixed colluvium weathered from shale, siltstone, and sandstone. Permeability is moderate. These soils are on lower mountainsides, lower side slopes of foothills, benches, foot slopes, and colluvial fans. Slopes range from 4 to 70 percent. Shelocta soils are fine-loamy, mixed, mesic Typic Hapludults.

Shelocta soils are on the same landscape as Bethesda, Dekalb, Fairpoint, Fedscreek, Gilpin, Grigsby, Hazleton, Potomac, Rayne, and Rigley soils. Fedscreek soils are coarse-loamy and have a cambic horizon. Grigsby and Potomac soils are alluvial and do not have an argillic horizon. Grigsby soils are coarse-loamy. Potomac soils are sandy-skeletal. Hazleton soils are loamy-skeletal and have a cambic horizon. Gilpin and Dekalb soils are moderately deep. Dekalb soils are loamy-skeletal and have a cambic horizon. Fairpoint and Bethesda soils formed in strip mine spoil and are loamy-skeletal. Rayne soils formed in residuum. Rigley soils are coarse-loamy.

Typical pedon of Shelocta loam, in an area of Hazleton-Fedscreek-Shelocta complex, 30 to 70 percent slopes, very stony; in Johnson County, about 1.3 miles west of Chandlerville on Rock House Fork, 5,500 feet south of the Lawrence County line; in the Sitka Quadrangle:

Oi—1 inch to 0; partly decomposed hardwood and pine litter.

Ap—0 to 7 inches; yellowish brown (10YR 5/4) loam; weak fine granular structure; very friable; many fine and medium, and few coarse roots; 3 percent sandstone channers; neutral; gradual wavy boundary.

Bt1—7 to 13 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; common fine and medium, and few coarse roots; common fine tubular pores; 5 percent sandstone channers; common faint brown clay

films on faces of peds; strongly acid; gradual smooth boundary.

Bt2—13 to 24 inches; brownish yellow (10YR 6/6) loam; moderate medium subangular blocky structure; firm; common fine and medium, and few coarse roots; common fine tubular pores; 10 percent sandstone channers; common faint brown clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt3—24 to 38 inches; yellowish brown (10YR 5/6) channery silt loam; common medium faint strong brown mottles; moderate medium subangular blocky structure; firm; few fine and medium roots; few fine tubular pores; 15 percent sandstone channers; many distinct brown (10YR 5/3) clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt4—38 to 47 inches; yellowish brown (10YR 5/4) channery loam; common distinct light brownish gray (2.5Y 6/2) mottles; weak medium subangular blocky structure; firm; few fine and medium roots; few fine tubular pores; 20 percent sandstone channers; few faint brown clay films on faces of peds; strongly acid; gradual smooth boundary.

C—47 to 62 inches; light olive brown (2.5Y 5/4) very channery loam; common distinct light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/8) mottles; massive; firm; 40 percent sandstone channers; strongly acid.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 40 inches. Rock fragments of sandstone, siltstone, and shale, 0.1 to 15 inches in length, range from 2 to 35 percent in the Ap horizon, from 5 to 50 percent in the individual Bt subhorizons, and from 15 to 70 percent in the C horizon. In unlimed areas, reaction is extremely acid to strongly acid.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4.

The Bt horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 2 to 6. It is silty clay loam, silt loam, loam, or their channery or very channery analogs. Some pedons have mottles in shades of brown and, in the lower part, in shades of gray.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6. It is silt loam, silty clay loam, loam, or their channery, very channery, or extremely channery analogs. Some pedons are mottled in shades of brown, olive, or gray.

Figure 16.—Typical pedon of Sharondale channery loam, in an area of Sharondale-Hazleton-Kimper complex, 30 to 80 percent slopes, extremely stony.

Stokly Series

The Stokly series consists of very deep, somewhat poorly drained soils that formed in mixed alluvium derived from sandstone, siltstone, and shale. Permeability is moderately rapid. These soils are on flood plains. Slopes range from 0 to 3 percent.

Stokly soils are coarse-loamy, mixed, acid, mesic Aeric Fluvaquents. These soils in this survey area are a taxadjunct to the Stokly series because the pH is higher than defined for the series. This difference does not alter use, management, or behavior.

Stokly soils are on the same landscape as Allegheny, Grigsby, Nelse, and Potomac soils. Grigsby

soils are well drained. Nelse soils are well drained and are on steeper slopes. Allegheny soils have an argillic horizon and are fine-loamy. Potomac soils are sandy-skeletal.

Typical pedon of Stokly fine sandy loam, occasionally flooded; in Johnson County, about 400 feet north of the Oil Springs Elementary School; in the Oil Springs Quadrangle:

Ap—0 to 6 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; friable; many fine and medium roots; slightly acid; clear smooth boundary.

Bw—6 to 17 inches; dark brown (10YR 4/3) fine sandy loam; common medium distinct grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/6) mottles; moderate medium subangular blocky structure; friable; few fine tubular pores; few fine and medium roots; slightly acid; gradual smooth boundary.

Bg1—17 to 25 inches; light brownish gray (2.5Y 6/2) fine sandy loam; few medium prominent dark yellowish brown (10YR 4/6) and dark brown (10YR 4/3) mottles; weak medium subangular blocky structure; friable; common fine tubular pores; few fine roots; neutral; gradual smooth boundary.

Bg2—25 to 32 inches; light brownish gray (2.5Y 6/2) fine sandy loam; common medium prominent yellowish brown (10YR 5/6) and dark brown (10YR 4/3) mottles; weak medium subangular blocky structure; friable; few fine tubular pores; neutral; gradual smooth boundary.

BC—32 to 38 inches; light brownish gray (10YR 6/2) and brown (10YR 5/3) fine sandy loam; common medium prominent light olive brown (2.5Y 5/4) and common fine distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; few fine tubular pores; few fine roots; neutral; gradual smooth boundary.

Cg—38 to 52 inches; mottled light brownish gray (10YR 6/2) fine sandy loam; common medium distinct light yellowish brown (2.5YR 6/4) and dark yellowish brown (10YR 4/4) mottles; friable; neutral; gradual smooth boundary.

Cg—52 to 62 inches; light brownish gray (10YR 6/2) sandy loam; common medium prominent dark yellowish brown (10YR 4/4) mottles; friable; neutral.

The solum is 20 to 40 inches or more thick. Depth to bedrock is more than 5 feet. Rock fragments, mainly sandstone and siltstone pebbles, range from 0 to 15 percent in the solum and from 0 to 40 percent in the C horizon. Reaction ranges from slightly acid to neutral.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4.

The Bw horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4 or value of 6 or 7 and chroma of 3 or 4. Mottles are in shades of brown or gray. Texture is fine sandy loam, sandy loam, loam, or their gravelly analog.

The Bg horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 2 or less, or value of 4 or 5 and chroma of 1 or 0; or it has hue of 5Y, value of 4 or 5, and chroma of 2 or less. Mottles are in shades of gray or brown. Texture is fine sandy loam, sandy loam, loam, or their gravelly analog.

The BC and Cg horizons have the same range in color as the Bg horizon. They are fine sandy loam, sandy loam, loam, or their gravelly, very gravelly, channery, or very channery analogs.

Udorthents

Udorthents consists of mixed soil and rock material that have been drastically disturbed. In most places the soil material has been transported several hundred yards from the cut area to the fill site. Most areas of Udorthents are along the Big Sandy River Valley at Paintsville, Prestonsburg, and other larger communities. Many small areas have been delineated along major streams where mountainsides have been cut and valleys filled for development of residential and small commercial buildings.

Udorthents are highly variable; therefore, a typical pedon is not given. They generally have bedrock at a depth of 6 to 50 feet or more. Rock fragments make up about 5 to 75 percent of the volume. They range from a few inches to more than 5 feet. They are mostly sandstone, siltstone, or shale that is randomly oriented. The percentage of each rock varies greatly with depth. In many areas, displaced rock fragments bridge voids; as a result, pores are discontinuous, irregular, and larger than texture porosity. Such voids vary in size, frequency, and prominence.

The texture of the soil material is highly variable. The content of clay ranges from about 5 to 45 percent. The content of sand ranges from about 25 to 80 percent. Reaction is very strongly acid to moderately alkaline.

The color range depends on the parent rock and soil material. Hue generally is 5YR to 5Y. Generally, the soils are mottled regardless of depth or spacing of material.

Paper, scrap metal, wood, glass, other artifacts are common.

Formation of the Soils

This section discusses the factors of soil formation, relates them to the soils in the survey area, and explains the processes of soil formation.

Factors of Soil Formation

The characteristics of a soil at any given point on the landscape depend on the physical and chemical composition of the parent material and on climate, relief, plant and animal life, and time (*17,18*). Soils form by the interaction of these five factors. The relative importance of each factor differs from one soil to another. In some areas one factor may dominate the formation of soil characteristics, and in other areas another factor may dominate.

Because the interrelationships between the five factors are so complex, the effect of any one factor is difficult to determine.

In the eastern coalfields of Kentucky, the greatest influence on soils has been human activities. For example, bulldozers and other earthmovers have been used in making major modifications over large areas.

Parent Material

Parent material is the unconsolidated geologic material in which soils formed. It influences the physical and chemical properties of the soil and the rate of soil formation.

In Floyd and Johnson Counties, soils formed in four types of parent material. They are residual material derived mainly from weathering of rocks of Pennsylvanian age, colluvial material deposited on mountainsides over long periods of time, recent alluvial deposits on flood plains and stream terraces, and soil and geologic material both of which were disturbed during strip mining or construction.

Residual parent material weathered from rocks is mostly on crests, upper side slopes, and noses. Residuum is derived mainly from sandstone, siltstone, and shale with intermittent coal seams. In places thin beds and concretions of limestone are in sedimentary rocks. Residuum is the parent material for Dekalb, Marrowbone, and Gilpin soils.

Colluvial material deposited by water and gravity covers roughly the lower one-third to two-thirds of mountains. The material generally is sandy or loamy and in many areas has a high content of rock fragments. This material ranges in thickness from about 40 inches on the upper part of the mountainside to more than 60 inches on the lower part. Hazleton, Fedscreek, Sharondale, and Shelocta soils formed in colluvial material.

Recent alluvium has been deposited where streams washed material from uplands. In most areas Grigsby and Stokly soils formed in recent alluvium. Allegheny, Chavies, and Cotaco soils formed in older alluvium. They are not subject to flooding as often as are Grigsby and Stokly soils.

Bethesda, Fairpoint, and Myra soils formed in mixed soil material and rock fragments resulting from mining.

Climate

Climate has a pronounced effect on soils and vegetation within a relatively small geographic area. Soil development and physiological activity of plants within the different microclimates have been documented by field and laboratory data. The data was gathered while the soil was surveyed. Soils on uplands are mesic, or medium, in soil temperature and udic, or humid, in moisture regime.

South- and west-facing slopes receive more direct radiation from the sun and are hotter and drier than the north- and east-facing slopes. For example, Gilpin soils on crests have thin 0 and A horizons but have a well developed B horizon. The coolest sites are the lower slopes facing east to north and the concave draws in coves. On Sharondale soils in coves, the dark A horizon is about 16 inches thick. It overlies a weakly developed B horizon.

Relief

In soil formation, relief controls surface drainage and affects water percolation. Relief can also affect the soil depth and available water capacity. Available water capacity, in turn, affects plant and animal life and some soil-forming processes. Dekalb, Marrowbone, and other soils on crests and noses generally are less than

40 inches deep over bedrock. Also, they have a weakly developed B horizon. Hazleton, Fedscreek, and other soils on middle and lower mountainsides generally are more than 60 inches deep over bedrock.

Natural differences in elevation and shape of landforms account for many differences in the kinds of soils that formed in the survey area. Residual soils formed on crests, upper mountainsides, and noses. Most soils on middle and lower mountainsides, on benches, and in coves formed in colluvial material.

Plant and Animal Life

All living organisms, including vegetation, bacteria, fungi, and animals, actively affect the formation of soils. Vegetation generally supplies the organic matter that decomposes to give soils a dark colored surface layer. It also transfers or cycles nutrients from the subsoil to the surface layer. Bacteria and fungi decompose the organic matter and release the minerals into the soil. Worms, insects, and burrowing animals, which mix the soil, affect soil tilth and porosity.

Tillage and management practices also affect the physical properties of soils. Use of lime, fertilizer, insecticides, and herbicides can alter the chemical properties of the soils. Movement of vehicles on the soil surface causes surface compaction, which makes the soil more dense.

Time

The length of time that parent material has been in place and exposed to the active forces of climate and to plant and animal life strongly influences the nature of soil.

The soils in Floyd and Johnson Counties are relatively young. As weathering processes act upon the exposed rocks, mostly on crests, upper side slopes, and noses, the residue is subjected to the forces of water and gravity. Weathered soil material and rock fragments are carried downslope and deposited as colluvium.

Where the colluvial deposits become thicker, the heavy weight of the colluvium, the steepness of slope, and water seeping along the bedrock tend to move the mass very slowly and irregularly downslope onto the flood plain. Soil is removed from valleys by the action of streams. Thus, the valleys slowly become wider while the mountains become smaller.

Relatively young soils on crests and upper side slopes have a developed soil structure and a B horizon well defined by color. But, they have little accumulated illuvial clay. Marrowbone and Dekalb soils are examples.

Some soils on less sloping mountainsides have a thick, well defined B horizon that has a significant amount of accumulated illuvial clay. Examples are Shelocta and Gilpin soils. Kimper, Sharondale, and other soils in coves and on concave slopes of cool aspects have a thick dark surface layer.

Soils in valleys are either on flood plains or on stream terraces. Grigsby and Stokly soils, for example, are on flood plains and do not have a well developed B horizon. But, Allegheny and Cotaco soils on stream terraces do have a well developed B horizon.

Processes of Soil Formation

The soil-forming factors result in the different layers, or soil horizons, of a profile. The soil profile extends from the surface down to material little altered by the soil-forming processes.

Most soils have three major horizons; the A, B, and C horizons. Soils under a forest canopy have an O horizon (for organic) at the surface. This horizon is an accumulation of organic material, such as twigs and leaves, or of humified organic material that has not been mixed with mineral material. Numbers and letters are used to indicate differences that mark the subdivisions within the major horizons. The Bt horizon, for example, represents the most strongly developed part of a B horizon that has accumulated clay from an overlying horizon. Shelocta and Gilpin soils have a Bt horizon.

The A horizon is a mineral surface layer. It is darkened by humified organic matter. An Ap horizon commonly is a plow layer, also darkened with organic matter. The A horizon is a layer of maximum leaching, or eluviation, of clay and iron. If considerable leaching has taken place and organic matter has not darkened the soil material, an E horizon is formed. This is normally the lightest colored horizon in the profile.

The B horizon, or subsoil, normally underlies the A horizon. It is the horizon of maximum illuviation. It accumulates the most clay, iron, aluminum, or other compounds leached from the surface layer.

In Kimper and some other soils, the B horizon formed mainly by alteration of the original material rather than by illuviation. The causes of this alteration can be weathered parent material, released iron, which gives a rusty color, and a developed soil structure instead of the original rock sediment structure. The B horizon commonly has a blocky structure. It generally is firmer and lighter in color than the A horizon, but is darker in color than the C or E horizon.

The C horizon is below the A or B horizon. It consists of material that has been little altered by the

soil-forming processes. It can be modified by weathering.

In young soils, such as those formed in recent alluvium or in man-deposited fill material, the C horizon is near or at the soil surface. In these soils, the B horizon, and in places even the A horizon, is absent.

Several processes are involved in the formation of soil horizons. They include the accumulation of organic matter, the leaching of soluble constituents, the chemical reduction and movement of iron, the formation of soil structure, and the formation and translocation of clay minerals. These processes often operate simultaneously and over long periods.

The accumulation and incorporation of organic matter takes place as plant residue and applied organic material decompose and are mixed into the soil. These additions darken the mineral soil material and are responsible for forming the A horizon.

For a distinct subsoil to form, a soil must be leached of lime and more soluble materials. After leaching has taken place, the clay can be translocated more easily and hence moved as part of the percolant. Clay has accumulated in the Bt horizon of the soils classified as Ultisols by being leached from the A horizon and deposited in the B horizon as a result of flocculation and the drying up of the percolating water. Also, clay from dissolved silica and aluminum has accumulated in these horizons. The more inert material is silt- and sand-sized quartz. It concentrates in the A horizon as the more soluble material and clay are leached into the horizon below.

The naturally well drained soils in the survey area generally have a yellowish brown or strong brown subsoil. These colors come from finely divided iron oxide minerals that coat the sand, silt, or clay particles. These iron oxides formed from iron released during the weathering of silica minerals in the present soil or in the parent material in which the soil developed.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial fan. A fan-shaped mass of soil and rock deposited by a stream at the point where it emerges from an upland stream into a broader valley.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces. Warm aspect is slope of more than 15 percent facing an azimuth of 135 to 315 decrees. Cool aspect is slope of more than 15 percent facing an azimuth of 315 to 135 degrees.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Back slopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench. A landform with a relatively flat, horizontal, long, narrow surface bounded on one side by a steeper ascending slope and on the other side by a steeper descending slope.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvial fan. A fan-shaped mass of soil material and rock at the base of a hill or at the point where a stream enters a valley. A colluvial fan is deposited mainly by the action of gravity.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cove. The area of rounded, concave slopes at the head of a narrow, steep valley.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crest. The highest line of a range of mountains or hills from which the surface slopes downward in opposite directions.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine earth. The part of the soil finer than a No. 10 (2 mm) U.S. standard sieve.

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be

limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6\4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nose (landform). The projecting ridge descending from the crest of a mountain. Also called nose slope.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Rippable bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Saddle. This landform is the low point in the crestline of a mountain. It commonly is on a divide between the heads of streams flowing in opposite directions.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 6 percent
Sloping	6 to 12 percent
Moderately steep	12 to 20 percent
Steep	20 to 30 percent
Very steep	30 to 70 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil depth classes. Terms used to describe soil depth are as follows:

Shallow	less than 20 inches deep
Moderately deep	20 to 40 inches deep
Deep	40 to 60 inches deep
Very deep	more than 60 inches deep

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and

clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1965-85 at Tomahawk, Kentucky)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	42.0	18.3	30.2	71	-14	66	3.25	1.47	4.77	7	9.1
February----	45.5	18.3	31.9	77	-9	45	3.07	1.66	4.30	7	7.5
March-------	58.3	28.3	43.3	83	7	190	4.18	2.67	5.54	9	3.3
April-------	69.0	37.8	53.4	89	20	402	4.22	2.38	5.84	8	.1
May---------	76.8	45.9	61.4	91	26	663	4.91	2.59	6.94	9	.0
June--------	83.5	55.3	69.4	95	39	882	4.06	2.09	5.77	8	.0
July--------	86.3	60.0	73.2	96	47	1029	5.66	3.93	7.25	9	.0
August------	85.5	59.5	72.5	95	46	1008	4.44	2.41	6.22	7	.0
September---	79.3	51.9	65.6	93	35	768	3.35	1.60	4.86	6	.0
October-----	68.6	38.5	53.6	86	21	429	3.22	2.05	4.27	6	.0
November----	57.5	29.8	43.7	81	11	167	3.82	2.09	5.34	8	.9
December----	47.6	22.8	35.2	75	0	82	3.96	2.01	5.65	8	3.4
Yearly:											
Average----	66.7	38.9	52.8	---	---	---	---	---	---	---	---
Extreme----	---	---	---	97	-14	---	---	---	---	---	---
Total------	---	---	---	---	---	5731	48.14	41.11	54.81	92	24.3

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1965-85 at Tomahawk, Kentucky)

Probability	Temperature: 24 °F or lower	Temperature: 28 °F or lower	Temperature: 32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 16	May 12	May 20
2 years in 10 later than--	Apr. 12	May 7	May 15
5 years in 10 later than--	Apr. 5	Apr. 26	May 5
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 15	Oct. 1	Sept. 21
2 years in 10 earlier than--	Oct. 21	Oct. 7	Sept. 27
5 years in 10 earlier than--	Nov. 2	Oct. 19	Oct. 10

Table 3.--Growing Season

(Recorded in the period 1965-85 at Tomahawk, Kentucky)

Probability	Daily minimum temperature: Higher than 24 °F	Daily minimum temperature: Higher than 28 °F	Daily minimum temperature: Higher than 32 °F
	Days	Days	Days
9 years in 10	192	149	128
8 years in 10	198	158	138
5 years in 10	210	175	157
2 years in 10	223	192	176
1 year in 10	229	201	186

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Floyd County	Johnson County	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Pct
AbB	Allegheny loam, 2 to 6 percent slopes, rarely flooded	455	917	1,372	0.3
AeB	Allegheny loam, 2 to 6 percent slopes, occasionally flooded	747	153	900	0.2
AeC	Allegheny loam, 6 to 15 percent slopes, occasionally flooded	185	47	232	0.1
ChB	Chavies fine sandy loam, 2 to 6 percent slopes, rarely flooded	91	109	200	*
Co	Cotaco loam, rarely flooded	63	391	454	0.1
DgF	Dekalb-Gilpin-Marrowbone complex, 20 to 80 percent slopes, very stony	72,357	27,637	99,994	23.7
Dm	Dumps, coal	736	53	789	0.2
FbB	Fairpoint-Bethesda complex, 0 to 6 percent slopes	168	540	708	0.2
FbD	Fairpoint-Bethesda complex, 6 to 30 percent slopes	442	2,032	2,474	0.6
FbF	Fairpoint-Bethesda complex, 30 to 70 percent slopes, stony	3,654	9,300	12,954	3.1
FsF	Fedscreek-Shelocta complex, 20 to 50 percent slopes	1,440	1,103	2,543	0.6
GfF	Gilpin-Fedscreek-Marrowbone complex, 20 to 60 percent slopes	0	19,600	19,600	4.6
Gr	Grigsby fine sandy loam, occasionally flooded	4,137	1,807	5,944	1.4
HkF	Hazleton-Fedscreek-Kimper complex, 30 to 80 percent slopes, very stony	32,693	29,995	62,688	14.9
HmF	Hazleton-Fedscreek-Marrowbone complex, 30 to 80 percent slopes, very stony	69,478	26,148	95,626	22.7
HsF	Hazleton-Fedscreek-Shelocta complex, 30 to 70 percent slopes, very stony	0	37,822	37,822	9.0
Kn	Knowlton silt loam, rarely flooded	329	139	468	0.1
MyB	Myra very channery fine sandy loam, 0 to 6 percent slopes	204	0	204	*
MyD	Myra very channery fine sandy loam, 6 to 30 percent slopes	272	0	272	0.1
MyF	Myra very channery fine sandy loam, 30 to 70 percent slopes, stony	5,243	0	5,243	1.2
NeD	Nelse loam, 4 to 25 percent slopes, frequently flooded	977	846	1,823	0.4
PsC	Potomac-Shelocta-Grigsby complex, 2 to 15 percent slopes	2,710	0	2,710	0.6
RaC	Rayne-Gilpin complex, 6 to 15 percent slopes	0	504	504	0.1
RoF	Rigley-Rock outcrop complex, 30 to 70 percent slopes	0	815	815	0.2
SaF	Sharondale-Hazleton-Kimper complex, 30 to 80 percent slopes, extremely stony	44,674	0	44,674	10.6
SeC	Shelocta loam, 6 to 15 percent slopes	413	496	909	0.2
ShC	Shelocta-Grigsby-Stokly complex, 2 to 15 percent slopes	4,762	4,890	9,652	2.3
St	Stokly fine sandy loam, occasionally flooded	544	238	782	0.2
UrC	Udorthents-Urban land complex, 0 to 15 percent slopes	4,720	2,334	7,054	1.7
	Water in large areas	1,728	1,000	2,728	0.6
	Total	253,222	168,916	422,138	100.0

* Less than 0.05 percent.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Tobacco	Soybeans	Wheat	Grass-legume hay	Pasture
		Bu	Lbs	Bu	Bu	Ton	AUM*
AbB, AeB-------- Allegheny	IIe	125	2,800	35	35	3.0	7.0
AeC------------- Allegheny	IIIe	110	2,500	30	35	3.0	7.0
ChB------------- Chavies	IIe	110	1,800	35	35	3.0	7.0
Co-------------- Cotaco	IIw	105	2,100	35	30	3.0	6.0
DgF------------- Dekalb-Gilpin- Marrowbone	VIIe	---	---	---	---	---	---
Dm**. Dumps, coal	VIIIs						
FbB, FbD-------- Fairpoint- Bethesda	VIs	---	---	---	---	---	3.0
FbF------------- Fairpoint- Bethesda	VIIe	---	---	---	---	---	---
FsF------------- Fedscreek- Shelocta	VIIe	---	---	---	---	---	---
GfF------------- Gilpin- Fedscreek- Marrowbone	VIIe	---	---	---	---	---	---
Gr-------------- Grigsby	IIw	120	2,800	---	40	4.0	7.0
HkF------------- Hazleton- Fedscreek- Kimper	VIIe	---	---	---	---	---	---
HmF------------- Hazleton- Fedscreek- Marrowbone	VIIe	---	---	---	---	---	---
HsF------------- Hazleton- Fedscreek- Shelocta	VIIe	---	---	---	---	---	---
Kn-------------- Knowlton	IIIw	80	---	25	---	2.0	6.0

See footnote at end of table.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Corn	Tobacco	Soybeans	Wheat	Grass-legume hay	Pasture
		Bu	Lbs	Bu	Bu	Ton	AUM*
MyB, MyD-------- Myra	VIs	---	---	---	---	---	3.0
MyF------------- Myra	VIIe	---	---	---	---	---	---
NeD------------- Nelse	IVe	60	---	---	---	2.5	5.0
PsC:							
Potomac---------	IVs	---	---	---	---	---	---
Shelocta--------	IIIe	---	---	---	---	---	---
Grigsby---------	IIw	---	---	---	---	---	---
RaC------------- Rayne-Gilpin	IIIe	100	2,200	---	35	3.0	7.0
RoF**:							
Rigley----------	VIIe	---	---	---	---	---	---
Rock outcrop----	VIIIs						
SaF------------- Sharondale- Hazleton- Kimper	VIIe	---	---	---	---	---	---
SeC------------- Shelocta	IIIe	80	2,000	30	30	3.0	7.0
ShC------------- Shelocta-------- Grigsby--------- Stokly----------	 IIIe IIw IIw	85	2,000	30	30	3.0	7.0
St-------------- Stokly	IIw	80	1,400	30	30	2.5	6.0
UrC**:							
Udorthents------	VIs	---	---	---	---	---	---
Urban land------	VIIIs	---	---	---	---	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.
** See description of the map unit for composition and behavior characteristics of the map unit.

Table 6.--Capability Classes and Subclasses

(Miscellaneous areas are excluded. Dashes indicate no acreage)

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I:				
Floyd County	---	---	---	---
Johnson County	---	---	---	---
II:				
Floyd County	8,633	1,293	7,340	---
Johnson County	5,669	1,179	4,490	---
III:				
Floyd County	4,583	4,254	329	---
Johnson County	4,022	3,883	139	---
IV:				
Floyd County	2,197	977	---	1,220
Johnson County	846	846	---	---
V:				
Floyd County	---	---	---	---
Johnson County	---	---	---	---
VI:				
Floyd County	1,086	---	---	1,086
Johnson County	2,572	---	---	2,572
VII:				
Floyd County	229,539	229,539	---	---
Johnson County	152,257	152,257	---	---
VIII:				
Floyd County	5,619	---	---	5,619
Johnson County	2,387	---	---	2,387

Table 7.--Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
AbB, AeB, AeC---Allegheny	Slight	Slight	Slight	Severe	Shortleaf pine------	80	130	Eastern white pine, yellow-poplar, black walnut, shortleaf pine, white oak, white ash, northern red oak.
					Yellow-poplar-------	93	95	
					Virginia pine-------	72	112	
					Sugar maple---------	---	---	
					White ash-----------	---	---	
					Northern red oak----	---	---	
					American elm--------	---	---	
					Red maple-----------	---	---	
					Pignut hickory------	---	---	
					Black oak-----------	80	62	
					White oak-----------	78	60	
					Eastern redcedar----	---	---	
					Black cherry--------	---	---	
ChB-------------Chavies	Slight	Slight	Slight	Severe	Shortleaf pine------	76	122	Eastern white pine, yellow-poplar, black walnut, northern red oak, white oak, shortleaf pine.
					Northern red oak----	---	---	
					Yellow-poplar-------	93	95	
					Black walnut--------	---	---	
					Black cherry--------	---	---	
					Sugar maple---------	---	---	
					Red maple-----------	---	---	
					Hickory-------------	---	---	
					White oak-----------	---	---	
					American sycamore---	---	---	
Co--------------Cotaco	Slight	Slight	Slight	Severe	Virginia pine-------	75	115	White oak, eastern white pine, yellow-poplar, sweetgum, shortleaf pine.
					White oak-----------	83	60	
					American beech------	---	---	
					Black oak-----------	87	69	
					Yellow-poplar-------	95	98	
DgF**:								
Dekalb---------(warm aspect)	Moderate	Severe	Severe	Moderate	Black oak-----------	68	50	Shortleaf pine, white oak.
					Shortleaf pine------	60	88	
					Hickory-------------	---	---	
					White oak-----------	65	47	
					Red maple-----------	---	---	
					Post oak------------	---	---	
Gilpin---------(warm aspect)	Severe	Severe	Moderate	Moderate	Black oak-----------	70	52	Shortleaf pine, white oak.
					White oak-----------	65	47	
					Scarlet oak---------	72	54	
					Chestnut oak--------	68	50	
					Shortleaf pine------	60	88	
					Virginia pine-------	66	102	
Marrowbone-----(warm aspect)	Severe	Severe	Moderate	Moderate	Shortleaf pine------	75	120	White oak, shortleaf pine.
					Virginia pine-------	---	---	
					White oak-----------	---	---	
					Black oak-----------	---	---	
					Red maple-----------	---	---	
					Hickory-------------	---	---	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
DgF**:								
Dekalb (cool aspect)	Moderate	Severe	Slight	Moderate	Black oak	71	53	Eastern white pine, shortleaf pine, white oak.
					White oak	72	54	
					Hickory	---	---	
					American beech	---	---	
					Yellow-poplar	90	90	
					Scarlet oak	74	56	
Gilpin (cool aspect)	Severe	Severe	Slight	Moderate	Black oak	80	62	Shortleaf pine, eastern white pine, white oak, yellow-poplar, northern red oak.
					Yellow-poplar	90	90	
					White oak	73	55	
					Scarlet oak	77	59	
					Chestnut oak	76	58	
					Shortleaf pine	70	110	
					Virginia pine	75	115	
Marrowbone (cool aspect)	Severe	Severe	Slight	Moderate	Yellow-poplar	95	98	Yellow-poplar, northern red oak, white oak, eastern white pine, shortleaf pine.
					Sweet birch	---	---	
					American beech	---	---	
					Northern red oak	---	---	
					Shortleaf pine	85	140	
FbB**, FbD**, FbF:								
Fairpoint	Severe	Severe	Moderate	Moderate	Loblolly pine	82	114	Eastern white pine, black locust, yellow-poplar, shortleaf pine, white oak.
					Sweetgum	---	---	
					Black locust	---	---	
Bethesda	Severe	Severe	Moderate	Moderate	Black oak	73	55	Eastern white pine, black locust, white oak, shortleaf pine.
					Yellow-poplar	94	97	
					Sweetgum	---	---	
					Black locust	92	---	
					Loblolly pine	69	91	
FsF**:								
Fedscreek (warm aspect)	Severe	Severe	Moderate	Severe	White oak	62	45	Shortleaf pine, eastern white pine, white oak.
					Black oak	66	48	
					American beech	---	---	
					Pignut hickory	---	---	
					Yellow-poplar	---	---	
					Virginia pine	---	---	
Shelocta (warm aspect)	Severe	Severe	Moderate	Severe	White oak	65	47	Shortleaf pine, white oak, eastern white pine.
					Black oak	63	46	
					Scarlet oak	70	52	
					Yellow-poplar	94	97	
					American beech	---	---	
					Blackgum	---	---	
					Red maple	55	---	
					Chestnut oak	66	48	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
FsF**:								
Fedscreek------ (cool aspect)	Severe	Severe	Slight	Severe	Yellow-poplar-------	90	90	Yellow-poplar, northern red oak, white oak, white ash, black walnut, eastern white pine.
					White oak-----------	70	52	
					Blackgum------------	---	---	
					Black oak-----------	75	57	
					American basswood---	---	---	
					Black walnut--------	---	---	
Shelocta------- (cool aspect)	Severe	Severe	Slight	Severe	White oak-----------	77	59	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
					Yellow-poplar-------	99	105	
					Cucumbertree--------	---	---	
					American beech------	---	---	
					Shortleaf pine------	79	128	
					Red maple-----------	81	62	
					Scarlet oak---------	81	62	
					Chestnut oak--------	76	58	
					Black oak-----------	79	61	
GfF**:								
Gilpin--------- (warm aspect)	Severe	Severe	Moderate	Moderate	Black oak-----------	70	52	Shortleaf pine, white oak.
					White oak-----------	65	47	
					Scarlet oak---------	72	54	
					Chestnut oak--------	68	50	
					Shortleaf pine------	60	88	
					Virginia pine-------	66	102	
Fedscreek------ (warm aspect)	Severe	Severe	Moderate	Severe	White oak-----------	62	45	Shortleaf pine, eastern white pine, white oak.
					Black oak-----------	66	48	
					American beech------	---	---	
					Pignut hickory------	---	---	
					Yellow-poplar-------	---	---	
					Virginia pine-------	---	---	
Marrowbone----- (warm aspect)	Severe	Severe	Moderate	Moderate	Shortleaf pine------	75	120	Shortleaf pine, white oak.
					Virginia pine-------	---	---	
					White oak-----------	---	---	
					Black oak-----------	---	---	
					Red maple-----------	---	---	
					Hickory-------------	---	---	
GfF**:								
Gilpin--------- (cool aspect)	Severe	Severe	Slight	Moderate	Black oak-----------	80	62	Eastern white pine, white oak, northern red oak, yellow-poplar.
					Yellow-poplar-------	90	90	
					White oak-----------	73	55	
					Scarlet oak---------	77	59	
					Chestnut oak--------	76	58	
					Shortleaf pine------	70	110	
					Virginia pine-------	75	115	
Fedscreek------ (cool aspect)	Severe	Severe	Slight	Severe	Yellow-poplar-------	90	90	Yellow-poplar, northern red oak, white oak, white ash, black walnut, eastern white pine.
					White oak-----------	70	52	
					Blackgum------------	---	---	
					Black oak-----------	75	57	
					American basswood---	---	---	
					Black walnut--------	---	---	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
GfF**:								
Marrowbone (cool aspect)	Severe	Severe	Slight	Moderate	Yellow-poplar	95	98	Yellow-poplar, northern red oak, white oak, eastern white pine, shortleaf pine.
					Sweet birch	---	---	
					American beech	---	---	
					Northern red oak	---	---	
					Shortleaf pine	85	140	
Gr: Grigsby	Slight	Slight	Slight	Severe	Yellow-poplar	110	124	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white oak, northern red oak, white ash.
					Northern red oak	85	67	
					White oak	85	67	
					Black walnut	---	---	
					American sycamore	---	---	
					Sweetgum	---	---	
					Red maple	---	---	
					Hickory	---	---	
HkF**:								
Hazleton	Severe	Severe	Slight	Moderate	Northern red oak	89	71	Eastern white, pine, shortleaf pine, northern red oak.
					Yellow-poplar	104	114	
					White oak	---	---	
					Black oak	85	67	
					Black locust	---	---	
Fedscreek	Severe	Severe	Slight	Severe	Yellow-poplar	90	90	Yellow-poplar, northern red oak, white oak, white ash, black walnut, eastern white pine.
					White oak	70	52	
					Blackgum	---	---	
					Black oak	75	57	
					American basswood	---	---	
					Black walnut	---	---	
Kimper	Severe	Severe	Slight	Severe	White oak	76	58	Yellow-poplar, white ash, northern red oak, white oak, eastern white pine, black walnut.
					Yellow-poplar	112	127	
					Sugar maple	---	---	
					American basswood	---	---	
					American beech	---	---	
					Sweet birch	---	---	
					Northern red oak	75	57	
HmF**:								
Hazleton	Severe	Severe	Moderate	Moderate	Black oak	76	58	Eastern white pine, shortleaf pine, white oak.
					White oak	72	54	
					Scarlet oak	76	58	
					Chestnut oak	---	---	
Fedscreek	Severe	Severe	Moderate	Severe	White oak	62	45	Shortleaf pine, eastern white pine, white oak.
					Black oak	66	48	
					American beech	---	---	
					Pignut hickory	---	---	
					Yellow-poplar	---	---	
					Virginia pine	---	---	
Marrowbone	Severe	Severe	Moderate	Moderate	Shortleaf pine	75	120	Shortleaf pine, white oak.
					Virginia pine	---	---	
					White oak	---	---	
					Black oak	---	---	
					Red maple	---	---	
					Hickory	---	---	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
HsF**:								
Hazleton------- (warm aspect)	Severe	Severe	Moderate	Moderate	Black oak-----------	76	58	Eastern white pine, shortleaf pine, white oak.
					White oak-----------	72	54	
					Scarlet oak---------	76	58	
					Chestnut oak--------	---	---	
Fedscreek------ (warm aspect)	Severe	Severe	Moderate	Severe	White oak-----------	62	45	Shortleaf pine, eastern white pine, white oak.
					Black oak-----------	66	48	
					American beech------	---	---	
					Pignut hickory------	---	---	
					Yellow-poplar-------	---	---	
					Virginia pine-------	---	---	
Shelocta------- (warm aspect)	Severe	Severe	Moderate	Severe	White oak-----------	65	47	Shortleaf pine, white oak, eastern white pine.
					Black oak-----------	73	46	
					Scarlet oak---------	70	52	
					Yellow-poplar-------	90	97	
					Blackgum------------	---	---	
					Red maple-----------	---	---	
					Chestnut oak--------	66	48	
					Hickory-------------	---	---	
HsF**:								
Hazleton------- (cool aspect)	Severe	Severe	Slight	Moderate	Northern red oak----	84	71	Eastern white, pine, shortleaf pine, yellow-poplar, northern red oak.
					Yellow-poplar-------	104	114	
					White oak-----------	---	---	
					Black oak-----------	85	67	
					Black locust--------	---	---	
Fedscreek------ (cool aspect)	Severe	Severe	Slight	Severe	Yellow-poplar-------	90	90	Yellow-poplar, northern red oak, white oak, white ash, black walnut, eastern white pine.
					White oak-----------	70	52	
					Blackgum------------	---	---	
					Black oak-----------	75	57	
					American basswood---	---	---	
					Black walnut--------	---	---	
Shelocta------- (cool aspect)	Severe	Severe	Slight	Severe	White oak-----------	77	59	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
					Yellow-poplar-------	99	105	
					Cucumbertree--------	---	---	
					American beech------	---	---	
					Shortleaf pine------	79	128	
					Red maple-----------	---	---	
					Scarlet oak---------	80	62	
					Chestnut oak--------	76	58	
					Black oak-----------	79	61	
Kn-------------- Knowlton	Slight	Moderate	Moderate	Severe	Sweetgum------------	95	122	Sweetgum, pin oak, green ash, American sycamore.
					Black oak-----------	---	---	
					Pin oak-------------	105	104	
					Red maple-----------	---	---	
					White oak-----------	---	---	
					Boxelder------------	---	--	
					Slippery elm--------	---	--	
					American sycamore---	---	--	
MyB, MyD, MyF--- Myra	Slight	Moderate	Moderate	Moderate	Loblolly pine-------	68	90	Eastern white pine, white oak, loblolly pine, black locust.
					Black locust--------	---	---	
					American sycamore---	---	---	
					Sweetgum------------	---	---	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
NeD------------- Nelse	Slight	Moderate	Moderate	Severe	Sweetgum------------	98	132	Green ash, American sycamore, sweetgum.
					Boxelder------------	---	---	
					Silver maple--------	---	---	
					Black willow--------	---	---	
					River birch---------	---	---	
					Green ash-----------	---	---	
					American sycamore---	---	---	
PsC**:								
Potomac---------	Slight	Slight	Moderate	Moderate	Northern red oak----	70	52	Northern red oak, white oak, American sycamore, black walnut, eastern white pine.
					White oak-----------	70	52	
					Eastern white pine--	80	144	
					Black walnut--------	---	--	
					American sycamore---	---	--	
					Eastern redcedar----	---	--	
Shelocta--------	Slight	Slight	Slight	Severe	White oak-----------	77	59	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
					Yellow-poplar-------	99	105	
					Cucumbertree--------	---	---	
					American beech------	---	---	
					Shortleaf pine------	77	128	
					Red maple-----------	---	---	
					Scarlet oak---------	80	62	
					Chestnut oak--------	76	58	
					Black oak-----------	79	61	
Grigsby---------	Slight	Slight	Slight	Severe	Yellow-poplar-------	110	124	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white oak, northern red oak, white ash.
					Northern red oak----	85	67	
					White oak-----------	85	67	
					Black walnut--------	---	--	
					American sycamore---	---	--	
					Sweetgum------------	---	--	
					Red maple-----------	---	--	
					Hickory-------------	---	--	
RaC**:								
Rayne-----------	Slight	Slight	Slight	Severe	Northern red oak----	80	62	Eastern white pine, yellow-poplar, white oak, northern red oak.
					Yellow-poplar-------	90	90	
					Eastern white pine--	---	---	
					Virginia pine-------	---	---	
					Shortleaf pine------	75	120	
					White oak-----------	---	---	
Gilpin----------	Slight	Slight	Slight	Moderate	Black oak-----------	80	62	Shortleaf pine, eastern white pine, white oak, yellow-poplar, northern red oak.
					Yellow-poplar-------	90	90	
					White oak-----------	73	55	
					Scarlet oak---------	77	59	
					Chestnut oak--------	76	58	
					Shortleaf pine------	70	110	
					Virginia pine-------	75	115	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
RoF**:								
Rigley	Severe	Severe	Slight	Moderate	Shortleaf pine	80	130	White oak, northern red oak, yellow-poplar, eastern white pine, shortleaf pine.
					White oak	74	56	
					Black oak	80	62	
					Northern red oak	---	---	
					Yellow-poplar	---	---	
					American beech	---	---	
					Hickory	---	---	
					Eastern hemlock	---	---	
Rock outcrop.								
SaF**:								
Sharondale	Severe	Severe	Slight	Severe	Yellow-poplar	106	107	Yellow-poplar, black walnut, northern red oak, white oak, eastern white pine.
					Black locust	---	---	
					American basswood	---	---	
					Eastern redbud	---	---	
					Northern red oak	---	---	
					Cucumbertree	---	---	
					Black walnut	---	---	
					Sugar maple	---	---	
					Virginia pine	78	119	
					White ash	107	---	
Hazleton	Moderate	Severe	Slight	Moderate	Northern red oak	89	71	Eastern white pine, shortleaf pine, yellow-poplar, northern red oak.
					Yellow-poplar	---	---	
					White oak	---	---	
					Black oak	85	67	
					Black locust	---	---	
Kimper	Severe	Severe	Slight	Severe	White oak	76	58	Yellow-poplar, white ash, northern red oak, white oak, eastern white pine, black walnut.
					Yellow-poplar	112	127	
					Sugar maple	---	---	
					American basswood	---	---	
					American beech	---	---	
					Sweet birch	---	---	
					Northern red oak	75	57	
SeC Shelocta	Slight	Slight	Slight	Severe	White oak	77	59	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
					Yellow-poplar	99	105	
					Cucumbertree	---	---	
					American beech	---	---	
					Shortleaf pine	79	128	
					Red maple	---	---	
					Scarlet oak	80	62	
					Chestnut oak	76	58	
					Black oak	79	61	
ShC**:								
Shelocta	Slight	Slight	Slight	Severe	White oak	77	59	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
					Yellow-poplar	99	105	
					Cucumbertree	---	---	
					American beech	---	---	
					Shortleaf pine	79	128	
					Red maple	---	---	
					Scarlet oak	80	62	
					Chestnut oak	76	58	
					Black oak	79	61	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
ShC**:								
Grigsby	Slight	Slight	Slight	Severe	Yellow-poplar	110	124	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white oak, northern red oak, white ash.
					Northern red oak	85	67	
					White oak	85	67	
					Black walnut	---	---	
					American sycamore	---	---	
					Sweetgum	---	---	
					Red maple	---	---	
					Hickory	---	---	
ShC**:								
Stokly	Slight	Moderate	Moderate	Severe	Yellow-poplar	90	90	Eastern white pine, American sycamore, sweetgum, yellow-poplar, green ash.
					White oak	80	62	
					Black oak	80	62	
					Red maple	---	---	
					American sycamore	---	---	
					White ash	---	---	
					River birch	---	---	
					Sweetgum	---	---	
St: Stokly	Slight	Moderate	Moderate	Severe	Yellow-poplar	90	90	Eastern white pine, American sycamore, sweetgum, yellow-poplar, green ash.
					White oak	80	62	
					Black oak	80	62	
					Red maple	---	---	
					American sycamore	---	---	
					White ash	---	---	
					River birch	---	---	
					Sweetgum	---	---	

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

Table 8.--Recreational Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AbB, AeB: Allegheny	Severe: flooding.	Slight	Moderate: slope.	Slight	Slight.
AeC: Allegheny	Severe: flooding.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
ChB: Chavies	Severe: flooding.	Slight	Moderate: slope.	Slight	Slight.
Co: Cotaco	Severe: flooding.	Moderate: wetness.	Moderate: slope.	Moderate: wetness.	Moderate: wetness.
DgF*:					
Dekalb	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Marrowbone	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Dm*. Dumps, coal					
FbB*:					
Fairpoint	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight	Severe: droughty.
Bethesda	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight	Severe: droughty.
FbD*:					
Fairpoint	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: droughty, slope.
Bethesda	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: droughty, slope.
FbF*:					
Fairpoint	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Bethesda	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
FsF*:					
Fedscreek	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

Table 8.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GfF*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Fedscreek	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Marrowbone	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gr: Grigsby	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
HkF*:					
Hazleton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Fedscreek	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Kimper	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
HmF*:					
Hazleton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Fedscreek	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Marrowbone	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
HsF*:					
Hazleton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Fedscreek	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Kn: Knowlton	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
MyB: Myra	Severe: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
MyD: Myra	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
MyF: Myra	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
NeD: Nelse	Severe: flooding.	Moderate: slope, flooding.	Severe: slope, flooding.	Moderate: flooding.	Severe: flooding.

See footnote at end of table.

Table 8.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
PsC*:					
Potomac	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Shelocta	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Grigsby	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
RaC*:					
Rayne	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, depth to rock.
RoF*:					
Rigley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
SaF*:					
Sharondale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hazleton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Kimper	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
SeC Shelocta	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
ShC*:					
Shelocta	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Grigsby	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Stokly	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
St Stokly	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
UrC*:					
Udorthents.					
Urban land.					

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 9.--Wildlife Habitat

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
AbB, AeB: Allegheny	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AeC: Allegheny	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ChB: Chavies	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Poor.
Co: Cotaco	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor.
DgF*:										
Dekalb	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Marrowbone	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Dm*. Dumps, coal										
FbB*:										
Fairpoint	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
Bethesda	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
FbD*, FbF*:										
Fairpoint	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Bethesda	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
FsF*:										
Fedscreek	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Shelocta	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
GfF*:										
Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Fedscreek	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Marrowbone	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.

See footnote at end of table.

Table 9.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Gr------------------ Grigsby	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HkF*:										
Hazleton-----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Fedscreek----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Kimper-------------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
HmF*:										
Hazleton-----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Fedscreek----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Marrowbone---------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
HsF*:										
Hazleton-----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Fedscreek----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Shelocta-----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Kn------------------ Knowlton	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
MyB----------------- Myra	Very poor.	Very poor.	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
MyD, MyF------------ Myra	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
NeD----------------- Nelse	Fair	Good	Good	Good	Fair	Very poor.	Very poor.	Good	Good	Very poor.
PsC*:										
Potomac------------	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Shelocta-----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Grigsby------------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
RaC*:										
Rayne--------------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

Table 9.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
RaC*:										
Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
RoF*:										
Rigley	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop.										
SaF*:										
Sharondale	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Hazleton	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Kimper	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
SeC Shelocta	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ShC*:										
Shelocta	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Grigsby	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Stokly	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
St Stokly	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
UrC*:										
Udorthents.										
Urban land.										

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 10.--Building Site Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AbB, AeB: Allegheny	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
AeC: Allegheny	Moderate: slope.	Severe: flooding.	Severe: flooding.	Severe: flooding, slope.	Moderate: slope, flooding.	Moderate: slope.
ChB: Chavies	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
Co: Cotaco	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Moderate: wetness.
DgF*:						
Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Marrowbone	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Dm*. Dumps, coal						
FbB*:						
Fairpoint	Moderate: large stones.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Severe: small stones, droughty.
Bethesda	Moderate: dense layer, large stones.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Severe: droughty.
FbD*, FbF*:						
Fairpoint	Severe: slope.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: small stones, droughty, slope.
Bethesda	Severe: slope.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: droughty, slope.
FsF*:						
Fedscreek	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

Table 10.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
GfF*:						
Gilpin-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Fedscreek--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Marrowbone-------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gr---------------- Grigsby	Moderate: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
HkF*:						
Hazleton---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Fedscreek--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Kimper-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
HmF*:						
Hazleton---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Fedscreek--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Marrowbone-------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
HsF*:						
Hazleton---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Fedscreek--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Shelocta---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Kn---------------- Knowlton	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness.	Severe: wetness.
MyB--------------- Myra	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Severe: small stones.
MyD, MyF---------- Myra	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.

See footnote at end of table.

Table 10.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
NeD--------------- Nelse	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding, slope.	Severe: flooding.	Severe: flooding.
PsC*:						
Potomac----------	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: large stones. droughty, flooding.
Shelocta---------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Grigsby----------	Moderate: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
RaC*:						
Rayne------------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Gilpin-----------	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope, depth to rock.
RoF*:						
Rigley-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.						
SaF*:						
Sharondale-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, large stones, slope.
Hazleton---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Kimper-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
SeC--------------- Shelocta	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
ShC*:						
Shelocta---------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Grigsby----------	Moderate: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Stokly-----------	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness.
St---------------- Stokly	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness.

See footnote at end of table.

Table 10.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
UrC*:						
Udorthents.						
Urban land.						

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 11.--Sanitary Facilities

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AbB, AeB------------ Allegheny	Moderate: flooding.	Moderate: seepage, slope.	Moderate: flooding.	Moderate: flooding.	Good.
AeC----------------- Allegheny	Moderate: flooding, slope.	Severe: slope.	Moderate: flooding, slope.	Moderate: flooding, slope.	Fair: slope.
ChB----------------- Chavies	Moderate: flooding.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
Co------------------ Cotaco	Severe: wetness.	Moderate: seepage, slope.	Severe: wetness.	Severe: wetness.	Poor: small stones.
DgF*:					
Dekalb-------------	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: slope, small stones, depth to rock.
Gilpin-------------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: slope, depth to rock.
Marrowbone---------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Dm*. Dumps, coal					
FbB*:					
Fairpoint----------	Severe: percs slowly.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Poor: small stones.
Bethesda-----------	Severe: percs slowly.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Poor: small stones.
FbD*, FbF*:					
Fairpoint----------	Severe: percs slowly, slope.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Poor: small stones, slope.
Bethesda-----------	Severe: percs slowly, slope.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Poor: small stones, slope.
FsF*:					
Fedscreek----------	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.

See footnote at end of table.

Table 11.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
FsF*:					
Shelocta	Severe: slope.	Severe: slope.	Severe: seepage, slope, depth to rock.	Severe: slope.	Poor: slope.
GfF*:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: slope, depth to rock.
Fedscreek	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
Marrowbone	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Gr: Grigsby	Severe: flooding.	Severe: flooding, seepage.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Good.
HkF*:					
Hazleton	Severe: poor filter, slope.	Severe: seepage, slope, large stones.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Fedscreek	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
Kimper	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
HmF*:					
Hazleton	Severe: poor filter, slope.	Severe: seepage, slope, large stones.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Fedscreek	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
HmF*:					
Marrowbone	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.

See footnote at end of table.

Table 11.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HsF*:					
Hazleton	Severe: poor filter, slope.	Severe: seepage, slope, large stones.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Fedscreek	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
Shelocta	Severe: slope.	Severe: slope.	Severe: seepage, slope, depth to rock.	Severe: slope.	Poor: slope.
Kn: Knowlton	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness.	Severe: wetness.	Poor: wetness.
MyB: Myra	Severe: percs slowly.	Moderate: seepage, slope, large stones.	Severe: large stones.	Slight	Poor: small stones.
MyD, MyF: Myra	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.	Poor: small stones, slope.
NeD: Nelse	Severe: flooding, poor filter.	Severe: seepage, flooding, slope.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Fair: too sandy, slope.
PsC*:					
Potomac	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: seepage, small stones.
Shelocta	Moderate: percs slowly, slope.	Severe: slope.	Severe: seepage, depth to rock.	Moderate: slope.	Fair: slope, depth to rock.
Grigsby	Severe: flooding.	Severe: flooding, seepage.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Good.
RaC*:					
Rayne	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: slope, depth to rock.

See footnote at end of table.

Table 11.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
RaC*:					
Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
RoF*:					
Rigley	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Rock outcrop.					
SaF*:					
Sharondale	Severe: slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: small stones, slope.
Hazleton	Severe: poor filter, slope.	Severe: seepage, slope, large stones.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Kimper	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
SeC Shelocta	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, depth to rock.	Moderate: slope.	Fair: slope, depth to rock.
ShC*:					
Shelocta	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, depth to rock.	Moderate: slope.	Fair: slope, depth to rock.
Grigsby	Severe: flooding.	Severe: flooding, seepage.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Good.
Stokly	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
St Stokly	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
UrC*:					
Udorthents.					
Urban land.					

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 12.--Construction Materials

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AbB, AeB: Allegheny	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
AeC: Allegheny	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
ChB: Chavies	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Co: Cotaco	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
DgF*:				
Dekalb	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Gilpin	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Marrowbone	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Dm*. Dumps, coal				
FbB*:				
Fairpoint	Fair: shrink-swell, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Bethesda	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
FbD*:				
Fairpoint	Fair: shrink-swell, large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Bethesda	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
FbF*:				
Fairpoint	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
FbF*:				
Bethesda	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
FsF*:				
Fedscreek	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Shelocta	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
GfF*:				
Gilpin	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Fedscreek	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Marrowbone	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Gr Grigsby	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
HkF*:				
Hazleton	Poor: slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
Fedscreek	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Kimper	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
HmF*:				
Hazleton	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
HmF*:				
Fedscreek	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Marrowbone	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
HsF*:				
Hazleton	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Fedscreek	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Shelocta	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Kn: Knowlton	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
MyB: Myra	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
MyD: Myra	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
MyF: Myra	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
NeD: Nelse	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones, slope.
PsC*:				
Potomac	Fair: large stones.	Improbable: small stones.	Probable	Poor: large stones, small stones.
Shelocta	Fair: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Grigsby	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
RaC*:				
Rayne	Fair: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
Gilpin	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
RoF*:				
Rigley	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Rock outcrop.				

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
SaF*:				
Sharondale	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Hazleton	Poor: slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
Kimper	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
SeC: Shelocta	Fair: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
ShC*:				
Shelocta	Fair: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
Grigsby	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
Stokly	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
St: Stokly	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
UrC*:				
Udorthents.				
Urban land.				

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 13.--Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
AbB, AeB: Allegheny	Moderate: seepage, slope.	Severe: piping.	Deep to water	Favorable	Favorable.
AeC: Allegheny	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope.
ChB: Chavies	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Co: Cotaco	Moderate: seepage.	Severe: piping, wetness.	Favorable	Erodes easily, wetness.	Erodes easily.
DgF*:					
Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, droughty.
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Marrowbone	Severe: slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.
Dm*. Dumps, coal					
FbB*:					
Fairpoint	Moderate: slope.	Severe: piping.	Deep to water	Large stones	Large stones, erodes easily.
Bethesda	Moderate: slope.	Severe: seepage, piping.	Deep to water	Large stones	Large stones, erodes easily.
FbD*, FbF*:					
Fairpoint	Severe: slope.	Severe: piping.	Deep to water	Slope, large stones, slippage.	Large stones, slope, erodes easily.
Bethesda	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope, large stones, slippage.	Large stones, slope, erodes easily.
FsF*:					
Fedscreek	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
Shelocta	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
GfF*:					
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Fedscreek	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
Marrowbone	Severe: slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.
Gr Grigsby	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
HkF*:					
Hazleton	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones.	Large stones, slope.
Fedscreek	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
Kimper	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, large stones.	Large stones, slope.
HmF*:					
Hazleton	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones.	Large stones, slope.
Fedscreek	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
Marrowbone	Severe: slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.
HsF*:					
Hazleton	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones.	Large stones, slope.
Fedscreek	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
Shelocta	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
Kn Knowlton	Slight	Severe: wetness.	Percs slowly	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
MyB--------------- Myra	Moderate: seepage, slope.	Moderate: large stones.	Deep to water----	Large stones-----	Large stones, droughty.
MyD, MyF---------- Myra	Severe: slope.	Moderate: large stones.	Deep to water----	Slope, large stones.	Large stones, slope, droughty.
NeD--------------- Nelse	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water----	Slope, too sandy.	Slope, droughty.
PsC*:					
Potomac----------	Severe: seepage.	Severe: seepage.	Deep to water----	Large stones, too sandy.	Large stones, droughty.
Shelocta---------	Severe: seepage, slope.	Severe: piping.	Deep to water----	Slope------------	Slope.
Grigsby----------	Severe: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
RaC*:					
Rayne------------	Severe: slope.	Severe: piping.	Deep to water----	Slope------------	Slope.
Gilpin-----------	Severe: slope.	Severe: thin layer.	Deep to water----	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
RoF*:					
Rigley-----------	Severe: seepage, slope.	Severe: piping.	Deep to water----	Slope------------	Slope.
Rock outcrop.					
SaF*:					
Sharondale-------	Severe: seepage, slope.	Severe: large stones.	Deep to water----	Slope, large stones.	Large stones, slope.
Hazleton---------	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water----	Slope, large stones.	Large stones, slope.
Kimper-----------	Severe: seepage, slope.	Severe: piping.	Deep to water----	Slope, large stones.	Large stones, slope.
SeC--------------- Shelocta	Severe: seepage, slope.	Severe: piping.	Deep to water----	Slope------------	Slope.
ShC*:					
Shelocta---------	Severe: seepage, slope.	Severe: piping.	Deep to water----	Slope------------	Slope.

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
ShC*:					
Grigsby	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Stokly	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, cutbanks cave.	Wetness	Wetness.
St: Stokly	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, cutbanks cave.	Wetness	Wetness.
UrC*:					
Udorthents.					
Urban land.					

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 14.--Engineering Index Properties

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
AbB, AeB, AeC----Allegheny	0-8	Loam-------------	ML, CL	A-4	0	90-100	80-100	65-100	53-95	<35	NP-10
	8-42	Loam, sandy loam, fine sandy loam, silt loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	80-100	65-100	35-80	<35	NP-15
	42-89	Sandy loam, sandy clay loam, loam, silt loam.	SM, GC, ML, CL	A-4, A-6, A-2, A-1	0-5	65-100	55-100	35-100	20-75	<35	NP-15
ChB--------------Chavies	0-10	Fine sandy loam	SM, ML, CL-ML, SC-SM	A-4	0	85-100	75-100	40-90	40-75	<25	NP-5
	10-39	Fine sandy loam, silt loam, loam.	SM, ML	A-4	0	85-100	75-100	65-100	45-85	<35	NP-8
	39-64	Fine sandy loam, sandy loam, loam, silt loam.	SM, ML, CL-ML, SC-SM	A-4, A-2, A-1-B	0-5	70-100	60-95	40-85	20-75	<25	NP-5
Co---------------Cotaco	0-11	Loam-------------	ML, CL-ML, SM, SC-SM	A-4	0-5	80-100	75-95	55-85	35-80	<30	NP-7
	11-31	Sandy clay loam, clay loam, loam.	SC, SM, GC, CL	A-2, A-4, A-6, A-1-B	0-10	60-100	50-95	40-90	20-80	<35	NP-15
	31-62	Gravelly silt loam, clay loam, loam, silt loam.	SC, SM, GC, CL	A-2, A-4, A-6, A-1-B	0-10	60-100	50-95	40-90	20-80	<35	NP-15
DgF*: Dekalb----------	0-6	Sandy loam, channery sandy loam.	ML, CL-ML	A-4	0-5	80-90	75-85	70-80	55-70	10-32	NP-10
	6-21	Channery sandy loam, channery fine sandy loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	21-27	Channery sandy loam, flaggy sandy loam, very channery sandy loam, extremely channery sandy loam, very channery fine sandy loam.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of Table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
DgF*:											
Gilpin----------	0-5	Loam------------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-18	Channery loam, loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	18-28	Channery loam, very channery silt loam, very channery loam, channery silty clay loam, loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Marrowbone------	0-7	Fine sandy loam	SC-SM, SM, SC, GM	A-4	0-5	70-95	65-90	55-85	35-49	16-25	2-10
	7-37	Channery loam, loam, very channery fine sandy loam, fine sandy loam, sandy loam.	SC-SM, SM, SC, GM-GC	A-4, A-2-4	0-15	50-95	50-90	40-85	25-49	16-30	2-10
	37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Dm*. Dumps, coal											
FbB*, FbD*, FbF*:											
Fairpoint-------	0-4	Channery loam----	ML, GM, GM-GC, CL-ML	A-4, A-6	0-15	65-90	55-80	50-80	35-75	25-40	4-14
	4-62	Channery loam, very channery silty clay loam, very channery loam, extremely channery silt loam.	GC, SC, CL, CL-ML	A-4, A-6, A-7, A-2	15-30	55-75	25-65	20-65	15-60	25-50	4-24
Bethesda--------	0-5	Channery loam----	ML, GM, GM-GC, CL-ML	A-4, A-6	0-15	65-90	55-80	50-80	35-75	25-40	4-14
	5-62	Very channery loam, extremely channery loam, very channery silt loam, very channery silty clay loam.	GM-GC, ML, CL, GM	A-4, A-6, A-7, A-2	10-30	45-80	25-65	25-65	20-60	24-50	3-23

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
FsF*:											
Fedscreek-------	0-5	Fine sandy loam	ML, CL-ML	A-4, A-2	0-5	80-95	75-95	70-80	55-70	16-25	2-10
	5-48	Channery loam, very channery fine sandy loam, loam.	SC-SM, SM, SC	A-4, A--2-3	0-10	50-95	50-90	40-85	25-49	16-30	2-10
	48-63	Channery loam, loam, very channery fine sandy loam.	SC-SM, SM, SC, GM-GC	A-1, A-4, A-2-4	5-20	30-80	35-75	25-65	25-40	16-30	2-10
	63	Unweathered bedrock.	---	A-4, A-2-4	---	---	---	---	---	---	---
Shelocta--------	0-7	Loam-------------	ML, CL-ML	A-4	0-5	80-95	75-95	60-95	55-90	<35	NP-10
	7-47	Loam, channery silt loam, channery loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-90	25-40	4-15
	47-62	Channery silt loam, channery silty clay loam, very channery loam.	GM, GC, ML, CL	A-4, A-6, A-2, A-1-B	0-15	40-85	35-70	25-70	20-65	20-40	3-20
GfF*:											
Gilpin----------	0-5	Loam-------------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-18	Channery loam, loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	18-28	Channery loam, very channery silt loam, loam, very channery loam, very channery silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Fedscreek-------	0-5	Fine sandy loam	ML, CL-ML	A-4, A-2	0-5	80-95	75-95	70-80	55-70	16-25	2-10
	5-48	Channery loam, very channery fine sandy loam, loam.	SC-SM, SM, SC	A-4, A-2-4	0-10	50-95	50-90	40-85	25-49	16-30	2-10
	48-63	Channery loam, very channery fine sandy loam.	SC-SM, SM, SC, GM-GC	A-1, A-4, A-2-4	5-20	30-80	35-75	25-65	25-40	16-30	2-10
	63	Unweathered bedrock.	---	A-4, A-2-4	---	---	---	---	---	---	---
Marrowbone------	0-7	Fine sandy loam	SC-SM, SM, SC, GM	A-4	0-5	70-95	65-90	55-85	35-49	16-25	2-10
	7-37	Channery loam, loam, fine sandy loam, very channery fine sandy loam, sandy loam.	SC-SM, SM, SC, GM-GC	A-4, A-2-4	0-15	50-95	50-90	40-85	25-49	16-30	2-10
	37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
Gr---------------- Grigsby	0-5	Fine sandy loam	SM, SC-SM	A-2, A-4	0-5	80-100	80-100	50-95	25-50	<20	NP-5
	5-42	Loam, fine sandy loam, sandy loam.	ML, SM, SC, CL	A-2, A-4	0-5	80-100	80-100	70-100	30-70	<25	NP-10
	42-62	Fine sandy loam, loam, gravelly sandy loam.	SM, SC-SM, ML, GM-GC	A-2, A-1, A-4	0-30	40-100	30-100	25-100	20-70	<20	NP-5
HkF*:											
Hazleton--------	0-5	Fine sandy loam	ML	A-4	0-5	90-100	90-100	75-90	65-70	---	---
	5-38	Channery sandy loam, very channery sandy loam, very flaggy fine sandy loam.	GM, SM, ML, SC	A-2, A-4, A-1	0-50	60-95	45-90	35-70	20-55	<30	NP-8
	38-62	Very flaggy fine sandy loam, extremely channery fine sandy loam.	GM, SM, SC, GC	A-2, A-1, A-4	0-60	55-80	35-75	25-65	15-50	<30	NP-8
Fedscreek-------	0-5	Loam, fine sandy loam.	ML, CL-ML	A-4, A-2	0-5	80-95	75-95	70-80	55-70	16-25	2-10
	5-48	Channery loam, very channery fine sandy loam, loam.	SC-SM, SM, SC	A-4, A-2-4	0-10	50-95	50-90	40-85	25-49	16-30	2-10
	48-63	Channery loam, channery sandy loam, very channery fine sandy loam.	SC-SM, SM, SC, GM-GC	A-1, A-4, A-2-4	5-20	30-80	35-75	25-65	25-40	16-30	2-10
	63	Unweathered bedrock.	---	A-4, A-2-4	---	---	---	---	---	---	---
Kimper----------	0-6	Loam-------------	ML, CL-ML, SM	A-4	0-5	90-100	90-100	30-70	20-65	22-30	4-10
	6-54	Channery loam, channery silt loam, silt loam, very channery loam.	ML, CL-ML, GM, CL	A-2-4, A-4	5-20	40-85	40-75	30-70	20-65	27-41	6-18
	54-66	Very channery loam, very channery silt loam, very channery sandy loam.	ML, CL-ML, GM, CL	A-2-4, A-4, A-1-B	5-15	40-85	40-75	30-70	20-65	23-30	3-10
	66	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
HmF*:											
Hazleton--------	0-5	Fine sandy loam	ML	A-4	0-5	90-100	90-100	75-90	65-70	---	---
	5-38	Channery sandy loam, very channery sandy loam, very flaggy fine sandy loam.	GM, SM, ML, SC	A-2, A-4, A-1	0-50	60-95	45-90	35-70	20-55	<30	NP-8
	38-62	Very flaggy fine sandy loam, extremely channery fine sandy loam.	GM, SM, SC, GC	A-2, A-1, A-4	0-60	55-80	35-75	25-65	15-50	<30	NP-8
Fedscreek-------	0-5	Loam-------------	ML, CL-ML	A-4, A-2	0-5	80-95	75-95	70-80	55-70	16-25	2-10
	5-48	Channery loam, very channery fine sandy loam, loam.	SC-SM, SM, SC	A-4, A-2-4	0-10	50-95	50-90	40-85	25-49	16-30	2-10
	48-63	Channery loam, very channery fine sandy loam.	SC-SM, SM, SC, GM-GC	A-1, A-4, A-2-4	5-20	30-80	35-75	25-65	25-40	16-30	2-10
	63	Unweathered bedrock.	---	A-4, A-2-4	---	---	---	---	---	---	---
Marrowbone------	0-7	Fine sandy loam	SC-SM, SM, SC, GM	A-4	0-5	70-95	65-90	55-85	35-49	16-25	2-10
	7-37	Channery loam, loam, fine sandy loam, very channery fine sandy loam, sandy loam.	SC-SM, SM, SC, GM-GC	A-4, A-2-4	0-15	50-95	50-90	40-85	25-49	16-30	2-10
	37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
HsF*:											
Hazleton--------	0-5	Fine sandy loam	ML	A-4	0-5	90-100	90-100	75-90	65-70	---	---
	5-38	Channery sandy loam, very channery sandy loam, very flaggy fine sandy loam.	GM, SM, ML, SC	A-2, A-4, A-1	0-50	60-95	45-90	35-70	20-55	<30	NP-8
	38-62	Very flaggy fine sandy loam, extremely channery fine sandy loam.	GM, SM, SC, GC	A-2, A-1, A-4	0-60	55-80	35-75	25-65	15-50	<30	NP-8
Fedscreek-------	0-5	Loam-------------	ML, CL-ML	A-4, A-2	0-5	80-95	75-95	70-80	55-70	16-25	2-10
	5-48	Channery loam, very channery fine sandy loam, loam.	SC-SM, SM, SC	A-4, A-2-4	0-10	50-95	50-90	40-85	25-49	16-30	2-10
	48-63	Channery loam, very channery fine sandy loam.	SC-SM, SM, SC, GM-GC	A-1, A-4, A-2-4	5-20	30-80	35-75	25-65	25-40	16-30	2-10
	63	Unweathered bedrock.	---	A-4, A-2-4	---	---	---	---	---	---	---

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
HsF*:											
Shelocta	0-7	Loam	ML, CL-ML	A-4	0-5	80-95	75-95	60-95	55-90	<35	NP-10
	7-47	Loam, channery silt loam, channery loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-90	25-40	4-15
	47-62	Channery silt loam, channery silty clay loam, very channery loam.	GM, GC, ML, CL	A-4, A-6, A-2, A-1-B	0-15	40-85	35-70	25-70	20-65	20-40	3-20
Kn Knowlton	0-8	Silt loam	CL, CL-ML	A-4, A-6	0	100	75-100	75-100	70-100	25-40	5-15
	8-50	Loam, silt loam	CL	A-6, A-7	0	100	75-100	75-100	70-100	25-40	5-15
	50-71	Silt loam, silty clay loam, loam.	CL	A-6, A-7	0	100	75-100	75-100	75-100	35-50	20-30
MyB, MyD, MyF Myra	0-8	Very channery fine sandy loam.	GC, GM-GC	A-2, A-4, A-6, A-1-B	5-30	40-65	30-50	25-45	20-40	25-40	5-15
	8-63	Very channery silt loam, very channery loam, very channery silty clay loam.	GC, GM-GC	A-2, A-4, A-6, A-1-B	5-30	40-60	30-50	25-45	20-45	25-40	5-15
NeD Nelse	0-8	Loam	SC-SM, SM, CL-ML, ML	A-2-4, A-4	0-5	95-100	95-100	65-90	30-65	<25	NP-5
	8-39	Fine sandy loam, loam, loamy fine sand.	SM, SC-SM	A-2-4, A-4	0-5	95-100	90-100	60-85	25-45	<20	NP-5
	39-80	Loamy fine sand, fine sandy loam.	SM	A-2-4	0-5	95-100	90-100	60-85	15-30	<20	NP
PsC*:											
Potomac	0-11	Fine sandy loam	SM, ML, SC-SM, CL-ML	A-2, A-4	0-10	85-100	80-100	50-85	30-60	<20	NP-5
	11-62	Very cobbly loamy sand, very gravelly loamy sand, very gravelly sand.	SM, GM, SW-SM, GW-GM	A-1, A-2	15-50	50-80	35-70	20-50	5-25	<15	NP-3
Shelocta	0-7	Loam	ML, CL-ML	A-4	0-5	80-95	75-95	60-95	55-90	<35	NP-10
	7-47	Loam, channery silt loam, channery loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-90	25-40	4-15
	47-62	Channery silt loam, channery silty clay loam, very channery loam.	GM, GC, ML, CL	A-4, A-6, A-2, A-1-B	0-15	40-85	35-70	25-70	20-65	20-40	3-20
Grigsby	0-5	Fine sandy loam	SM, SC-SM	A-2, A-4	0-5	80-100	80-100	50-95	25-50	<20	NP-5
	5-42	Loam, fine sandy loam, sandy loam.	ML, SM, SC, CL	A-2, A-4	0-5	80-100	80-100	70-100	30-70	<25	NP-10
	42-62	Fine sandy loam, loam, gravelly sandy loam.	SM, SC-SM, ML, GM-GC	A-2, A-1, A-4	0-30	40-100	30-100	25-100	20-70	<20	NP-5

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
RaC*:											
Rayne-----------	0-7	Loam-------------	ML, CL	A-4	0-5	85-100	80-100	70-85	60-80	---	---
	7-40	Loam, channery silty clay loam, silt loam.	GM, ML, GC, CL	A-4, A-6, A-2	0-15	60-95	55-85	40-85	30-60	20-40	2-15
	40-72	Channery loam, silt loam, very channery silt loam, channery silty clay loam.	SM, ML, GM, GP-GM	A-4, A-2, A-1	0-35	40-90	15-80	15-75	10-60	20-35	NP-10
	72	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Gilpin----------	0-5	Loam-------------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-18	Channery loam, loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	18-28	Channery loam, very channery silt loam, very channery loam, channery silty clay loam, loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
RoF*:											
Rigley----------	0-14	Fine sandy loam, sandy loam.	SM, ML, SC-SM, CL-ML	A-2, A-4	0-10	80-95	75-90	55-80	25-65	<30	NP-7
	14-55	Channery sandy loam, channery loam, sandy loam, loam.	SM, ML, GM, GM-GC	A-2, A-4, A-1	0-10	65-95	60-90	40-75	20-60	<30	NP-7
	55-61	Channery sandy loam, channery loam, sandy loam.	GM, GC, SM, SC	A-2, A-1, A-4, A-6	0-20	55-80	45-70	30-60	15-50	<35	NP-15
Rock outcrop.											
SaF*:											
Sharondale------	0-11	Channery loam----	SC-SM, SC, GM, SM	A-1, A-2-4, A-4	15-35	35-80	30-75	25-65	20-40	16-25	2-10
	11-32	Very channery loam, extremely flaggy loam.	SC-SM, SC, GM, SM	A-1, A-2-4, A-4	10-40	30-70	25-65	20-60	10-40	16-25	2-10
	32-78	Very channery loam, very flaggy loam, extremely flaggy fine sandy loam.	SC-SM, SC, GM, SM	A-1, A-2-4, A-4	10-40	30-70	25-65	20-60	10-40	16-26	2-10

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
SaF*:											
Hazleton--------	0-5	Loam-------------	ML	A-4	0-5	90-100	90-100	75-90	65-70	---	---
	5-38	Channery sandy loam, very flaggy fine sandy loam, very channery sandy loam.	GM, SM, ML, SC	A-2, A-4, A-1	0-50	60-95	45-90	35-70	20-55	<30	NP-8
	38-62	Extremely channery fine sandy loam, very flaggy fine sandy loam.	GM, SM, SC, GC	A-2, A-1, A-4	0-60	55-80	35-75	25-65	15-50	<30	NP-8
Kimper----------	0-6	Loam-------------	ML, CL-ML, SM	A-4	0-5	90-100	90-100	30-70	20-65	22-30	4-10
	6-54	Channery loam, channery silt loam, silt loam, very channery loam.	ML, CL-ML, GM, CL	A-2-4, A-4	5-20	40-85	40-75	30-70	20-65	27-41	6-18
	54-66	Very channery loam, very channery silt loam, very channery sandy loam.	ML, CL-ML, GM, CL	A-2-4, A-4, A-1-B	5-15	40-85	40-75	30-70	20-65	23-30	3-10
	66	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
SeC-------------- Shelocta	0-7	Loam-------------	ML, CL-ML	A-4	0-5	80-95	75-95	60-95	55-90	<35	NP-10
	7-47	Loam, channery silt loam, channery loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-90	25-40	4-15
	47-62	Channery silt loam, channery silty clay loam, very channery loam.	GM, GC, ML, CL	A-4, A-6, A-2, A-1-B	0-15	40-85	35-70	25-70	20-65	20-40	3-20
ShC*:											
Shelocta--------	0-7	Loam-------------	ML, CL-ML	A-4	0-5	80-95	75-95	60-95	55-90	<35	NP-10
	7-47	Loam, channery silt loam, channery loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-90	25-40	4-15
	47-62	Channery silt loam, channery silty clay loam, very channery loam.	GM, GC, ML, CL	A-4, A-6, A-2, A-1-B	0-15	40-85	35-70	25-70	20-65	20-40	3-20
Grigsby---------	0-5	Fine sandy loam	SM, SC-SM	A-2, A-4	0-5	80-100	80-100	50-95	25-50	<20	NP-5
	5-42	Loam, fine sandy loam, sandy loam.	ML, SM, SC, CL	A-2, A-4	0-5	80-100	80-100	70-100	30-70	<25	NP-10
	42-62	Fine sandy loam, loam, sandy loam.	SM, SC-SM, ML, GM-GC	A-2, A-1, A-4	0-30	40-100	30-100	25-100	20-70	<20	NP-5

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
ShC*:											
Stokly	0-32	Fine sandy loam	ML, SM, SC, SC-SM	A-4	0	85-100	80-100	65-90	35-65	<30	NP-10
	32-62	Gravelly sandy loam, gravelly loam, loamy sand.	SM, SC, GM, GC	A-1-B, A-2-4, A-4	0	65-100	60-100	45-70	15-45	<30	NP-10
St	0-32	Fine sandy loam	ML, SM, SC, SC-SM	A-4	0	85-100	80-100	65-90	35-65	<30	NP-10
Stokly	32-62	Gravelly sandy loam, gravelly loam, loamy sand, sandy loam.	SM, SC, GM, GC	A-1-B, A-2-4, A-4	0	65-100	60-100	45-70	15-45	<30	NP-10
UrC*:											
Udorthents.											
Urban land.											

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 15.--Physical and Chemical Properties of the Soils

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
AbB, AeB, AeC----Allegheny	0-8	13-27	1.20-1.40	0.6-2.0	0.12-0.22	3.6-5.5	Low----------	0.32	4	1-4
	8-42	14-35	1.20-1.50	0.6-2.0	0.13-0.18	3.6-5.5	Low----------	0.28		
	42-89	6-35	1.20-1.40	0.6-2.0	0.08-0.17	3.6-5.5	Low----------	0.28		
ChB--------------Chavies	0-10	7-18	1.20-1.40	2.0-6.0	0.11-0.18	4.5-7.3	Low----------	0.24	4	.5-4
	10-39	7-18	1.20-1.40	2.0-6.0	0.11-0.20	4.5-7.3	Low----------	0.24		
	39-64	7-18	1.30-1.50	2.0-6.0	0.08-0.18	4.5-6.0	Low----------	0.24		
Co---------------Cotaco	0-11	7-27	1.20-1.40	0.6-6.0	0.12-0.20	3.6-5.5	Low----------	0.37	3	.5-4
	11-31	18-35	1.20-1.50	0.6-2.0	0.07-0.15	3.6-5.5	Low----------	0.28		
	31-62	18-35	1.20-1.50	0.6-2.0	0.07-0.15	3.6-5.5	Low----------	0.28		
DgF*:										
Dekalb----------	0-6	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-6.5	Low----------	0.24	2	2-4
	6-21	7-18	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low----------	0.17		
	21-27	5-15	1.20-1.50	>6.0	0.05-0.10	3.6-5.5	Low----------	0.17		
	27	---	---	2.0-6.0	---	---	-------------	----		
Gilpin----------	0-5	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
	5-18	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	18-28	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	28	---	---	0.2-2.0	---	---	-------------	----		
Marrowbone------	0-7	5-18	1.20-1.60	0.6-6.0	0.10-0.18	3.6-6.5	Low----------	0.24	2	.5-5
	7-37	5-27	1.20-1.70	0.6-6.0	0.08-0.16	3.6-6.0	Low----------	0.17		
	37	---	---	0.00-0.2	---	---	-------------	----		
Dm*. Dumps, coal										
FbB*, FbD*, FbF*:										
Fairpoint-------	0-4	18-27	1.40-1.55	0.6-2.0	0.09-0.16	5.6-7.3	Low----------	0.28	5	<.5
	4-62	18-35	1.60-1.80	0.2-0.6	0.03-0.10	5.6-7.3	Moderate-----	0.28		
Bethesda--------	0-5	18-27	1.40-1.55	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.28	5	<.5
	5-62	18-35	1.60-1.90	0.2-0.6	0.04-0.10	3.6-5.5	Low----------	0.32		
FsF*:										
Fedscreek-------	0-5	5-18	1.00-1.60	2.0-6.0	0.12-0.22	4.5-6.5	Low----------	0.24	4	.5-5
	5-48	5-27	1.20-1.70	2.0-6.0	0.10-0.18	4.5-6.0	Low----------	0.17		
	48-63	5-27	1.20-1.70	0.6-6.0	0.10-0.18	4.5-6.0	Low----------	0.17		
	63	---	---	0.0-0.2	---	---	-------------	----		
Shelocta--------	0-7	10-25	1.15-1.30	0.6-2.0	0.16-0.22	4.5-5.5	Low----------	0.32	4	.5-5
	7-47	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low----------	0.28		
	47-62	15-34	1.30-1.55	0.6-6.0	0.08-0.16	4.5-5.5	Low----------	0.17		
GfF*:										
Gilpin----------	0-5	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
	5-18	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	18-28	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	28	---	---	0.2-2.0	---	---	-------------	----		

See footnote at end of table.

Table 15.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
GfF*:										
Fedscreek-------	0-5	5-18	1.00-1.60	2.0-6.0	0.12-0.22	4.5-6.5	Low----------	0.24	4	.5-5
	5-48	5-27	1.20-1.70	2.0-6.0	0.10-0.18	4.5-6.0	Low----------	0.17		
	48-63	5-27	1.20-1.70	0.6-6.0	0.10-0.18	4.5-6.0	Low----------	0.17		
	63	---	---	0.0-0.2	---	---	-------------	----		
Marrowbone------	0-7	5-18	1.20-1.60	0.6-6.0	0.10-0.18	3.6-6.5	Low----------	0.24	2	.5-5
	7-37	5-27	1.20-1.70	0.6-6.0	0.08-0.16	3.6-6.0	Low----------	0.17		
	37	---	---	0.00-0.2	---	---	-------------	----		
Gr--------------- Grigsby	0-5	5-10	1.20-1.50	2.0-6.0	0.08-0.14	5.6-7.3	Low----------	0.28	5	1-4
	5-42	5-18	1.20-1.50	0.6-6.0	0.10-0.20	5.6-7.3	Low----------	0.28		
	42-62	5-10	1.20-1.50	2.0-6.0	0.03-0.16	5.1-7.3	Low----------	0.28		
HkF*:										
Hazleton--------	0-5	7-18	1.20-1.40	2.0-6.0	0.12-0.16	3.6-5.5	Low----------	0.17	3	2-4
	5-38	7-18	1.20-1.40	2.0-20	0.08-0.12	3.6-5.5	Low----------	0.15		
	38-62	5-15	1.20-1.40	2.0-20	0.06-0.12	3.6-5.5	Low----------	0.15		
Fedscreek-------	0-5	5-18	1.00-1.60	2.0-6.0	0.12-0.22	4.5-6.5	Low----------	0.24	4	.5-5
	5-48	5-27	1.20-1.70	2.0-6.0	0.10-0.18	4.5-6.0	Low----------	0.17		
	48-63	5-27	1.20-1.70	0.6-6.0	0.10-0.18	4.5-6.0	Low----------	0.17		
	63	---	---	0.0-0.2	---	---	-------------	----		
Kimper----------	0-6	12-27	1.15-1.30	0.6-6.0	0.15-0.22	4.1-7.3	Low----------	0.32	4	2-15
	6-54	18-30	1.20-1.70	0.6-6.0	0.13-0.20	4.5-6.0	Low----------	0.17		
	54-66	12-20	1.20-1.70	0.6-6.0	0.10-0.16	4.5-6.0	Low----------	0.17		
	66	---	---	0.00-0.2	---	---	-------------	----		
HmF*:										
Hazleton--------	0-5	7-18	1.20-1.40	2.0-6.0	0.12-0.16	3.6-5.5	Low----------	0.17	3	2-4
	5-38	7-18	1.20-1.40	2.0-20	0.08-0.12	3.6-5.5	Low----------	0.15		
	38-62	5-15	1.20-1.40	2.0-20	0.06-0.12	3.6-5.5	Low----------	0.15		
Fedscreek-------	0-5	5-18	1.00-1.60	2.0-6.0	0.12-0.22	4.5-6.5	Low----------	0.24	4	.5-5
	5-48	5-27	1.20-1.70	2.0-6.0	0.10-0.18	4.5-6.0	Low----------	0.17		
	48-63	5-27	1.20-1.70	0.6-6.0	0.10-0.18	4.5-6.0	Low----------	0.17		
	63	---	---	0.0-0.2	---	---	-------------	----		
Marrowbone------	0-7	5-18	1.20-1.60	0.6-6.0	0.10-0.18	3.6-6.5	Low----------	0.24	2	.5-5
	7-37	5-27	1.20-1.70	0.6-6.0	0.08-0.16	3.6-6.0	Low----------	0.17		
	37	---	---	0.00-0.2	---	---	-------------	----		
HsF*:										
Hazleton--------	0-5	7-18	1.20-1.40	2.0-6.0	0.12-0.16	3.6-5.5	Low----------	0.17	3	2-4
	5-38	7-18	1.20-1.40	2.0-20	0.08-0.12	3.6-5.5	Low----------	0.15		
	38-62	5-15	1.20-1.40	2.0-20	0.06-0.12	3.6-5.5	Low----------	0.15		
Fedscreek-------	0-5	5-18	1.00-1.60	2.0-6.0	0.12-0.22	4.5-6.5	Low----------	0.24	4	.5-5
	5-48	5-27	1.20-1.70	2.0-6.0	0.10-0.18	4.5-6.0	Low----------	0.17		
	48-63	5-27	1.20-1.70	0.6-6.0	0.10-0.18	4.5-6.0	Low----------	0.17		
	63	---	---	0.0-0.2	---	---	-------------	----		
Shelocta--------	0-7	10-25	1.15-1.30	0.6-2.0	0.16-0.22	4.5-5.5	Low----------	0.32	4	.5-5
	7-47	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low----------	0.28		
	47-62	15-34	1.30-1.55	0.6-6.0	0.08-0.16	4.5-5.5	Low----------	0.17		
Kn--------------- Knowlton	0-8	10-28	1.30-1.45	0.06-0.2	0.20-0.24	4.5-7.3	Low----------	0.43	5	1-2
	8-50	10-28	1.30-1.45	0.06-0.2	0.20-0.24	4.5-6.0	Low----------	0.43		
	50-71	18-31	1.40-1.60	0.06-0.2	0.18-0.20	4.5-6.0	Moderate-----	0.43		

See footnote at end of table.

Table 15.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
MyB, MyD, MyF----	0-8	12-30	1.40-1.65	0.2-2.0	0.06-0.14	6.1-8.4	Low-----------	0.32	5	<1
Myra	8-63	12-30	1.40-1.80	0.2-2.0	0.05-0.16	7.4-8.4	Low-----------	0.32		
NeD--------------	0-8	5-25	1.20-1.60	2.0-6.0	0.09-0.14	5.1-8.4	Low-----------	0.17	5	2-10
Nelse	8-39	2-18	1.40-1.80	2.0-20	0.09-0.14	5.1-8.4	Low-----------	0.15		
	39-80	2-12	1.40-1.80	2.0-20	0.05-0.10	5.1-8.4	Low-----------	0.15		
PsC*:										
Potomac---------	0-11	5-15	1.20-1.40	0.6-6.0	0.10-0.14	5.1-7.8	Low-----------	0.24	3	0-2
	11-62	4-10	1.30-1.60	>6.0	0.03-0.06	5.1-7.8	Low-----------	0.17		
Shelocta--------	0-7	10-25	1.15-1.30	0.6-2.0	0.16-0.22	4.5-5.5	Low-----------	0.32	4	.5-5
	7-47	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low-----------	0.28		
	47-62	15-34	1.30-1.55	0.6-6.0	0.08-0.16	4.5-5.5	Low-----------	0.17		
Grigsby---------	0-5	5-10	1.20-1.50	2.0-6.0	0.08-0.14	5.6-7.3	Low-----------	0.28	5	1-4
	5-42	5-18	1.20-1.50	0.6-6.0	0.10-0.20	5.6-7.3	Low-----------	0.28		
	42-62	5-10	1.20-1.50	2.0-6.0	0.03-0.16	5.1-7.3	Low-----------	0.28		
RaC*:										
Rayne-----------	0-7	10-27	1.20-1.40	0.6-2.0	0.14-0.18	4.5-5.5	Low-----------	0.28	3	1-3
	7-40	18-35	1.40-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Low-----------	0.20		
	40-72	10-30	1.40-1.60	0.6-2.0	0.10-0.16	4.5-5.5	Low-----------	0.20		
	72	---	---	0.06-2.0	---	---	-------------	----		
Gilpin----------	0-5	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low-----------	0.32	3	.5-4
	5-18	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low-----------	0.24		
	18-28	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low-----------	0.24		
	28	---	---	0.2-2.0	---	---	-------------	----		
RoF*:										
Rigley----------	0-14	7-18	1.20-1.40	2.0-6.0	0.09-0.15	4.5-7.3	Low-----------	0.24	4	.5-3
	14-55	7-18	1.30-1.60	2.0-6.0	0.09-0.15	3.6-5.5	Low-----------	0.17		
	55-61	7-40	1.30-1.60	2.0-6.0	0.07-0.15	3.6-5.5	Low-----------	0.17		
Rock outcrop.										
SaF*:										
Sharondale------	0-16	8-26	1.00-1.40	2.0-6.0	0.12-0.22	5.6-7.3	Low-----------	0.10	4	2-12
	16-32	8-26	1.20-1.70	2.0-6.0	0.12-0.20	5.6-7.3	Low-----------	0.17		
	32-78	8-26	1.20-1.70	2.0-6.0	0.08-0.18	5.6-7.3	Low-----------	0.17		
Hazleton--------	0-5	7-18	1.20-1.40	2.0-6.0	0.12-0.16	3.6-5.5	Low-----------	0.17	3	2-4
	5-48	7-18	1.20-1.40	2.0-20	0.08-0.12	3.6-5.5	Low-----------	0.15		
	48-63	5-15	1.20-1.40	2.0-20	0.06-0.12	3.6-5.5	Low-----------	0.15		
Kimper----------	0-6	12-27	1.15-1.30	0.6-6.0	0.15-0.22	4.1-7.3	Low-----------	0.32	4	2-15
	6-54	18-30	1.20-1.70	0.6-6.0	0.13-0.20	4.5-6.0	Low-----------	0.17		
	54-66	12-20	1.20-1.70	0.6-6.0	0.10-0.16	4.5-6.0	Low-----------	0.17		
	66	---	---	0.00-0.2	---	---	-------------	----		
SeC--------------	0-7	10-25	1.15-1.30	0.6-2.0	0.16-0.22	4.5-5.5	Low-----------	0.32	4	.5-5
Shelocta	7-47	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low-----------	0.28		
	47-62	15-34	1.30-1.55	0.6-6.0	0.08-0.16	4.5-5.5	Low-----------	0.17		
ShC*:										
Shelocta--------	0-7	10-25	1.15-1.30	0.6-2.0	0.16-0.22	4.5-5.5	Low-----------	0.32	4	.5-5
	7-47	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low-----------	0.28		
	47-62	15-34	1.30-1.55	0.6-6.0	0.08-0.16	4.5-5.5	Low-----------	0.17		

See footnote at end of table.

Table 15.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
ShC*:										
Grigsby----------	0-5	5-10	1.20-1.50	2.0-6.0	0.08-0.14	5.6-7.3	Low-----------	0.28	5	1-4
	5-42	5-18	1.20-1.50	0.6-6.0	0.10-0.20	5.6-7.3	Low-----------	0.28		
	42-62	5-10	1.20-1.50	2.0-6.0	0.03-0.16	5.1-7.3	Low-----------	0.28		
Stokly-----------	0-32	5-18	1.30-1.65	2.0-6.0	0.10-0.18	6.1-7.3	Low-----------	0.28	3	1-4
	32-62	7-18	1.35-1.65	2.0-6.0	0.08-0.18	6.1-5.5	Low-----------	0.17		
St---------------- Stokly	0-32	5-18	1.30-1.65	2.0-6.0	0.10-0.18	6.1-7.3	Low-----------	0.28	3	1-4
	32-62	7-18	1.35-1.65	2.0-6.0	0.08-0.18	5.5-6.1	Low-----------	0.17		
UrC*:										
Udorthents.										
Urban land.										

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 16.--Soil and Water Features

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In			
AbB-------------- Allegheny	B	Rare-------	---	---	>6.0	---	---	>60	---	Low------	High.
AeB, AeC--------- Allegheny	B	Occasional	Very brief to brief.	Dec-May	>6.0	---	---	>60	---	Low------	High.
ChB-------------- Chavies	B	Rare-------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
Co--------------- Cotaco	C	Rare-------	---	---	1.5-2.5	Apparent	Nov-May	>60	---	Moderate	High.
DgF*:											
Dekalb----------	C	None-------	---	---	>6.0	---	---	20-40	Hard	Low------	High.
Gilpin----------	C	None-------	---	---	>6.0	---	---	20-40	Soft	Low------	High.
Marrowbone------	C	None-------	---	---	>6.0	---	---	20-40	Hard	Low------	Moderate.
Dm*. Dumps, coal											
FbB*, FbD*, FbF*:											
Fairpoint-------	C	None-------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
Bethesda--------	C	None-------	---	---	>6.0	---	---	>60	---	Moderate	High.
FsF*:											
Fedscreek-------	B	None-------	---	---	>6.0	---	---	>40	Hard	Low------	Moderate.
Shelocta--------	B	None-------	---	---	>6.0	---	---	>40	Hard	Low------	High.
GfF*:											
Gilpin----------	C	None-------	---	---	>6.0	---	---	20-40	Soft	Low------	High.
Fedscreek-------	B	None-------	---	---	>6.0	---	---	>40	Hard	Low------	Moderate.
Marrowbone------	C	None-------	---	---	>6.0	---	---	20-40	Hard	Low------	Moderate.
Gr--------------- Grigsby	B	Occasional	Very brief to brief.	Dec-May	3.5-6.0	Apparent	Jan-Apr	>60	---	Low------	Low.
HkF*:											
Hazleton--------	B	None-------	---	---	>6.0	---	---	40-80	Hard	Low------	High.
Fedscreek-------	B	None-------	---	---	>6.0	---	---	>40	Hard	Low------	Moderate.
Kimper----------	B	None-------	---	---	>6.0	---	---	>40	Hard	Low------	Moderate.
HmF*:											
Hazleton--------	B	None-------	---	---	>6.0	---	---	40-80	Hard	Low------	High.
Fedscreek-------	B	None-------	---	---	>6.0	---	---	>40	Hard	Low------	Moderate.
Marrowbone------	C	None-------	---	---	>6.0	---	---	20-40	Hard	Low------	Moderate.

See footnote at end of table.

Table 16.--Soil and Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
HsF*:											
Hazleton	B	None	---	---	>6.0	---	---	40-80	Hard	Low	High.
Fedscreek	B	None	---	---	>6.0	---	---	>40	Hard	Low	Moderate.
Shelocta	B	None	---	---	>6.0	---	---	>40	Hard	Low	High.
Kn Knowlton	C	Rare	---	---	0-1.0	Apparent	Dec-Apr	>60	---	High	High.
MyB, MyD, MyF Myra	C	None	---	---	>6.0	---	---	>60	---	Low	Low.
NeD Nelse	B	Frequent	Brief	Jan-Dec	4.0-6.0	Apparent	Feb-Mar	>60	---	Low	Moderate.
PsC*:											
Potomac	A	Occasional	Brief	Nov-May	4.0-6.0	Apparent	---	>60	---	Low	Moderate.
Shelocta	B	None	---	---	>6.0	---	---	>40	Hard	Low	High.
Grigsby	B	Occasional	Very brief to brief.	Dec-May	3.5-6.0	Apparent	Jan-Apr	>60	---	Low	Low.
RaC*:											
Rayne	B	None	---	---	>6.0	---	---	>40	Soft	Low	High.
Gilpin	C	None	---	---	>6.0	---	---	20-40	Soft	Low	High.
RoF*:											
Rigley	B	None	---	---	>6.0	---	---	>60	---	Low	High.
Rock outcrop.											
SaF*:											
Sharondale	B	None	---	---	>6.0	---	---	>60	---	Low	Moderate.
Hazleton	B	None	---	---	>6.0	---	---	40-80	Hard	Low	High.
Kimper	B	None	---	---	>6.0	---	---	>40	Hard	Low	Moderate.
SeC Shelocta	B	None	---	---	>6.0	---	---	>40	Hard	Low	High.
ShC*:											
Shelocta	B	None	---	---	>6.0	---	---	>40	Hard	Low	High.
Grigsby	B	Occasional	Very brief to brief.	Dec-May	3.5-6.0	Apparent	Jan-Apr	>60	---	Low	Low.
Stokly	B	Occasional	Very brief	Dec-May	0.5-1.0	Apparent	Dec-May	>60	---	Moderate	High.
St Stokly	B	Occasional	Very brief	Dec-May	0.5-1.0	Apparent	Dec-May	>60	---	Moderate	High.
UrC*:											
Udorthents.											
Urban land.											

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 17.--Physical Analyses of Selected Soils

(A dash indicates the material was not detected. A blank indicates that the determination was not made. Th
typical pedons for the soil series in the survey area. For the location of the pedons, see "Soil Seri
Morphology." Soil samples were analyzed by the Kentucky Agricultural Experiment Station, Lexington, K

Soil name, report number, horizon, and depth in inches	Total			Size class and particle diameter (mm)							
				Sand							
	Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Sand coarser than very fine (2-0.1)	Very fine sand plus silt (0.1-0.002)	Te tu cla
	Pct <2mm										
Allegheny loam											
(89KY-115-4)											
Ap------- 0-8	45.8	41.1	13.1	1.0	1.7	6.1	22.4	14.5			1
Bt1------ 8-15	41.0	39.8	19.2	0.5	1.1	4.7	20.2	14.3	26.7		1
Bt2------ 15-28	44.6	33.1	22.3	0.0	1.2	5.5	23.0	14.4			1
Bt3------ 28-33	62.4	29.0	8.6	0.1	1.5	10.7	37.7	12.4	50.0		f
Bt4------ 33-42	69.0	24.9	6.1	0.4	1.6	13.8	41.9	11.3			f
BC1------ 42-55	66.5	26.6	6.9	0.3	1.3	10.9	42.9	11.1			f
BC2------ 55-72	62.2	31.4	6.4	0.2	0.6	5.9	40.7	14.7			f
C-------- 72-89	68.5	26.0	5.5	0.3	3.2	28.9	26.7	9.4			s
Fedscreek fine											
sandy loam											
(89KY-115-2)											
A-------- 0-5	57.1	30.9	12.0	5.5	7.5	8.6	24.4	11.2			f
Bw1------ 5-12	48.9	35.1	16.0	3.6	3.6	6.3	22.3	13.1			1
Bw2------ 12-27	45.7	42.8	11.5	3.6	2.8	5.6	20.9	12.9			1
Bw3------ 27-36	50.8	30.4	18.8	3.6	4.1	6.1	26.7	10.3			1
Bw4------ 36-48	62.9	24.7	12.4	4.4	7.5	10.8	31.7	8.4			f
BC------- 48-63	67.5	22.2	10.3	4.9	10.0	12.7	32.0	7.9			f
Kimper loam											
(89KY-115-3)											
A-------- 0-6	35.6	48.9	15.5	11.3	6.5	4.5	8.1	5.2			1
BA------- 6-11	29.3	54.2	16.5	5.4	4.9	4.4	8.8	5.8			s
Bw1------ 11-19	24.7	53.7	21.6	4.4	2.9	3.1	7.4	7.0			s
Bw2------ 19-27	28.8	52.6	18.6	5.9	3.9	3.5	8.3	7.2			s
Bw3------ 27-44	33.3	49.1	17.6	8.1	4.2	3.2	7.8	10.0			1
Bw4------ 44-54	41.9	52.5	15.6	6.8	4.9	5.3	13.2	11.8			1
BC------- 54-63	40.5	43.6	15.9	6.7	5.1	5.0	11.7	12.1			1

See footnote at end of table.

Table 17.--Physical Analyses Of Selected Soils--Continued

Soil name, report number, horizon, and depth in inches	Total: Sand (2-0.05 mm)	Total: Silt (0.05-0.002 mm)	Total: Clay (<0.002 mm)	Sand: Very coarse (2-1)	Sand: Coarse (1-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Sand coarser than very fine (2-0.1)	Very fine sand plus silt (0.1-0.002)	Tex tu cla
	Pct <2mm										
Knowlton silt loam (89KY-071-2)											
Ap------- 0-8	9.4	63.2	27.4	2.6	2.0	0.7	1.2	2.9			si
Btg1----- 8-15	10.3	68.0	21.7	1.9	2.3	1.3	2.0	2.8			si
Btg2----- 15-27	6.8	65.9	27.3	1.2	1.1	0.5	0.8	3.2			si
Btg3----- 27-36	7.6	63.9	28.5	0.6	1.6	0.7	1.2	3.4			si
Btg4----- 36-50	7.4	61.8	30.8	1.1	1.7	0.6	0.8	3.2			si
Btg5----- 50-59	7.9	61.1	31.0	1.3	1.4	0.7	1.2	3.2			si
BCg------ 59-71	10.4	60.0	29.6	1.5	2.1	1.1	2.2	3.5			si
Sharondale loam (89KY-071-1)											
A-------- 0-11	43.5	34.9	21.6	8.5	6.9	7.7	14.6	5.7			1
AB------- 11-16	40.1	34.4	25.5	5.3	4.7	6.6	15.6	8.0			1
Bw1------ 16-24	40.9	32.6	26.5	6.1	5.0	7.0	15.4	7.4			1
Bw2------ 24-32	41.6	31.6	26.8	7.2	4.9	7.0	14.8	7.6			1
Bw3------ 32-43	46.1	31.1	22.8	7.0	6.5	8.1	16.5	8.0			1
Bw4------ 43-52	42.5	32.9	24.6	7.5	5.8	7.3	14.5	7.4			1
BC------- 52-61	52.6	28.8	18.6	6.7	7.7	10.8	19.1	8.3			fs
C-------- 61-78	53.1	30.1	16.8	8.1	8.5	10.9	17.8	7.8			fs

* L means loam; sil, silt loam; fsl, fine silty loam; sicl, silty clay loam.

Table 18.--Chemical Analyses of Selected Soils

(Absence of an entry indicates that the determination was not made. The pedons are typical of the soil series in the location of the pedons, see the section "Soil Series and Their Morphology." Soil samples were analyzed b Agricultural Experiment Station, Lexington, Kentucky)

Soil name*, report number, horizon, and depth in inches	pH H_2O 1:1	Extractable cations: Ca	Extractable cations: Mg	Extractable cations: K	Extractable cations: Na	Extractable cations: Total (TEC)	Cation-exchange capacity: Ammonium acetate	Cation-exchange capacity: Sum of cations	Extractable acidity	Hydrogen plus aluminum	Base saturation: Ammonium acetate	Base saturation: Sum of cations	Organic matter	Ca carl equ
		Milliequivalents per 100 grams of soil									Pct	Pct	Pct	
Allegheny loam** (89KY-115-4)														
Ap----- 0 to 8	5.4	1.9	0.3	0.1	0.02	2.3	8.7	13.2	10.9	---	26.7	17.5	2.3	
Bt1---- 8 to 15	5.4	2.2	0.1	0.1	0.02	2.4	7.3	10.5	8.3	---	33.3	23.1	0.6	
Bt2---- 15 to 28	5.2	1.5	0.3	0.1	0.02	1.9	6.1	8.3	6.4	---	30.0	22.7	0.6	
Bt3---- 28 to 33	5.2	1.5	0.3	0.1	0.02	1.9	6.1	8.3	6.4	---	30.0	22.7	0.6	
Bt4---- 33 to 42	5.1	1.4	0.3	0.1	0.02	1.8	5.5	7.1	5.4	---	32.9	25.2	0.4	
BC1---- 42 to 55	5.2	0.9	0.4	0.1	0.02	1.4	6.5	7.2	5.7	---	32.4	20.3	1.1	
BC2---- 55 to 72	5.3	1.1	0.6	0.1	0.02	1.8	5.5	9.1	7.2	---	34.7	20.8	0.5	
C------ 72 to 89	5.3	0.9	0.5	0.1	0.02	1.5	4.4	7.3	5.8	---	35.5	21.1	0.4	
Fedscreek fine sandy loam (89KY-115-2)														
A------ 0 to 5	5.2	0.9	0.6	0.2	0.02	1.7	8.0	11.0	9.3	---	21.5	15.6	2.2	
Bw1---- 5 to 12	5.0	0.3	0.3	0.2	0.02	0.8	7.0	9.4	8.7	---	11.1	8.2	1.6	
Bw2---- 12 to 27	5.0	0.2	0.4	0.2	0.02	0.8	6.6	7.6	6.9	---	11.3	9.7	0.6	
Bw3---- 27 to 36	5.0	0.3	1.2	0.1	0.02	1.6	6.3	10.3	8.7	---	25.9	15.7	0.2	
Bw4---- 36 to 48	5.1	0.2	1.0	0.1	0.04	1.3	7.1	8.9	7.5	---	18.9	15.2	0.2	
BC----- 48 to 63	5.5	0.1	0.8	0.1	0.04	1.1	6.8	6.8	5.7	---	15.9	15.8	0.1	
Kimper loam (89KY-115-3)														
A------ 0 to 6	5.9	4.6	2.1	0.4	0.02	7.1	17.6	18.2	11.2	---	39.6	38.4	8.3	
BA----- 6 to 11	5.3	1.8	0.9	0.2	0.02	2.9	13.0	18.2	15.5	---	22.2	15.6	4.9	
Bw1---- 11 to 19	5.2	0.7	0.7	0.2	0.02	1.6	8.1	14.8	13.3	---	18.9	10.4	1.5	
Bw2---- 19 to 27	5.2	0.6	0.9	0.2	0.02	1.7	7.3	11.3	9.7	---	22.4	14.4	0.5	
Bw3---- 27 to 44	5.1	0.5	1.3	0.2	0.02	2.0	8.0	9.7	7.7	---	24.3	20.2	0.4	
Bw4---- 44 to 54	5.1	0.4	1.4	0.1	0.02	1.9	8.0	9.0	7.7	---	21.6	19.3	0.5	
BC----- 54 to 63	5.1	0.5	1.4	0.1	0.02	2.0	8.3	10.4	8.4	---	24.0	19.2	0.5	

See footnotes at end of table.

Table 18.--Chemical Analyses of Selected Soils--Continued

Soil name*, report number, horizon, and depth in inches	pH H_2O 1:1	Extractable cations: Ca	Extractable cations: Mg	Extractable cations: K	Extractable cations: Na	Extractable cations: Total (TEC)	Cation-exchange capacity: Ammonium acetate	Cation-exchange capacity: Sum of cat-ions	Extract-able acidity	Hydrogen plus aluminum	Base saturation: Ammonium acetate	Base saturation: Sum of cat-ions	Organic matter	Cal carb equi
		----------Milliequivalents per 100 grams of soil----------									Pct	Pct	Pct	
Knowlton silt loam*** (89KY-071-2)														
Ap----- 0 to 8	4.9	2.1	1.3	0.3	0.02	3.7	12.3	18.2	14.4	---	30.5	20.6	5.7	
Btg1--- 8 to 15	5.2	1.2	1.2	0.1	0.04	2.5	9.6	14.5	11.7	---	29.3	19.4	1.1	
Btg2--- 15 to 27	5.2	1.6	1.8	0.1	0.04	3.6	11.3	13.7	10.1	---	32.0	26.2	1.5	
Btg3--- 27 to 36	5.2	1.8	2.1	0.2	0.05	4.1	12.8	13.9	9.8	---	31.7	29.2	0.8	
Btg4--- 36 to 50	5.3	1.9	2.2	0.2	0.04	4.3	12.5	11.3	7.1	---	33.6	37.2	1.1	
Btg5--- 50 to 59	5.3	1.9	2.6	0.2	0.05	4.8	12.2	13.9	9.1	---	39.0	34.4.	1.0	
Bcg---- 59 to 71	5.7	2.2	2.9	0.2	0.09	5.4	12.4	15.0	9.7	---	42.9	35.5	0.8	
Sharondale channery loam**** (89KY-071-1)														
A------ 0 to 11	6.3	6.4	1.5	0.4	0.03	8.3	16.5	16.7	8.4	---	50.1	49.5	8.3	
AB----- 11 to 16	5.9	3.3	0.6	0.2	0.02	4.0	10.0	12.1	8.1	---	40.5	33.2	3.5	
Bw1---- 16 to 24	6.0	3.2	0.6	0.2	0.02	4.0	9.1	11.3	7.3	---	43.4	34.9	2.2	
Bw2---- 24 to 32	6.3	2.9	1.0	0.2	0.03	4.0	8.1	12.6	8.6	---	49.4	31.6	1.5	
Bw3---- 32 to 43	6.3	3.0	1.2	0.2	0.02	4.4	7.7	9.8	5.5	---	56.0	43.7	1.5	
Bw4---- 43 to 52	6.4	2.7	1.5	0.2	0.02	4.4	7.7	12.5	8.1	---	57.0	34.9	1.3	
BC----- 52 to 61	6.4	2.4	1.3	0.1	0.02	3.8	6.7	6.2	2.2	---	58.8	63.6	0.7	
C------ 61 to 78	6.4	2.5	1.4	0.2	0.02	4.1	6.7	8.8	4.7	---	60.9	46.4	0.7	

* Data is from the typical pedon in the survey.

** Data is from the official series type location.

*** This pedon shows an irregular distribution of organic carbon. According to field observation, the irregu
by numerous coal flakes.

**** This pedon shows that the 10- to 32-inch layer has less than 50 percent base saturation by the amonium

Table 19.--Sand Mineralogy of Selected Soils

(A dash indicates the mineral was not detected. TR indicates trace amounts of the mineral. The soils are tl the soil series in the survey area. For the location of the pedons, see the section "Soil Series and Tl Soil samples were analyzed by the Kentucky Agricultural Experiment Station, Lexington, Kentucky)

Soil name, report number, horizon, and depth in inches	Percent resistant minerals				Percent weatherable minerals							
	Quartz	Opaques	Resistant aggregates	Total resistant minerals	Feldspars	Mica	Kaolinite	Vermiculite	Muscovite	Plagioclase feldspar	Potassium feldspar	Se c
Allegheny loam (89KY-115-4)												
Bt1---- 8 to 15	65	---	---	65	23	6	4	2	---	---	---	--
Bt2---- 15 to 28	67	---	---	67	15	12	4	2	---	---	---	--
Fedscreek fine sandy loam (89KY-115-2)												
Bw1---- 5 to 12	58	---	---	58	16	18	5	3	---	---	---	--
Bw2---- 12 to 27	67	---	---	67	15	10	5	3	---	---	---	--
Bw3---- 27 to 36	66	---	---	66	15	10	6	3	---	---	---	--
Bw4---- 36 to 48	55	---	---	55	18	15	9	3	---	---	---	--
Kimper loam (89KY-115-3)												
Bw1---- 11 to 19	61	---	---	61	19	11	4	5	---	---	---	--
Bw2---- 19 to 27	61	---	---	61	10	20	6	3	---	---	---	--
Bw3---- 27 to 44	52	---	---	52	25	12	8	3	---	---	---	--
Knowlton silt loam (89KY-071-2)												
Btg1--- 8 to 15	60	---	---	60	24	11	5	---	---	---	---	--
Btg2--- 15 to 27	47	---	---	47	34	12	7	---	---	---	---	--
Btg3--- 27 to 36	47	---	---	47	15	26	8	4	---	---	---	--
Btg4--- 36 to 50	52	---	---	52	20	19	4	5	---	---	---	--
Sharondale loam (89KY-071-1)												
AB----- 11 to 16	81	---	---	81	7	---	6	6	---	---	---	--
Bw1---- 16 to 24	50	---	---	50	34	8	5	3	---	---	---	--
Bw2---- 24 to 32	80	---	---	80	9	8	---	3	---	---	---	--
Bw3---- 32 to 43	62	---	---	62	18	10	7	3	---	---	---	--

Table 20.--Engineering Index Test Data

(Dashes indicate that data were not available. LL means liquid limit; PI, plasticity index; MD
OM, optimum moisture; LS, linear shrinkage; and NP, nonplastic. Soil samples were tested
Laboratory, Fort Worth, Texas)

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution												L
			Percentage passing sieve--								Percentage smaller than--				
	AASHTO	Unified	3 inch	2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm		
			Pct												Pc
Allegheny loam: (89KY-115-4)															
8 to 42	A-4-1	CL-ML	100	100	100	100	100	100	99	53	39	29	19		2
42 to 72	A-4	SM-SC	100	100	100	100	100	100	99	39	25	17	12		2
Fedscreek fine sandy loam: (89KY-115-2)															
5 to 27	A-4	CL-ML	100	100	100	100	100	100	---	64	43	29	19		2
27 to 48	A-4-1	CL-ML	100	100	100	100	100	100	96	50	38	29	21		2
Kimper loam: (89KY-115-3)															
6 to 27	A-4-2	CL-ML	100	100	100	100	100	100	---	70	51	31	20		2
27 to 44	A-4-1	CL-ML	100	100	100	100	100	100	---	64	44	25	15		2
44 to 63	A-4	CL-ML	100	100	100	100	100	100	86	63	43	29	16		2
Knowlton silt loam: (89KY-071-2)															
15 to 36	A-6(15)	ML	100	100	100	100	100	100	---	93	78	49	27		4
36 to 59	A-7-6(15)	ML	100	100	100	100	100	100	---	94	77	49	28		4
Sharondale loam: (89KY-071-1)															
0 to 16	A-6-7	ML	100	100	100	100	100	100	---	70	53	37	21		3
16 to 43	A-4-4	CL	100	100	100	100	100	100	---	64	54	36	22		2
43 to 78	A-4	ML	100	100	100	100	100	100	---	51	44	28	15		2

Table 21.--Classification of the Soils

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Allegheny	Fine-loamy, mixed, mesic Typic Hapludults
Bethesda	Loamy-skeletal, mixed, acid, mesic Typic Udorthents
Chavies	Coarse-loamy, mixed, mesic Ultic Hapludalfs
Cotaco	Fine-loamy, mixed, mesic Aquic Hapludults
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Fairpoint	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Fedscreek	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Grigsby	Coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Hazleton	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Kimper	Fine-loamy, mixed, mesic Umbric Dystrochrepts
Knowlton	Fine-silty, mixed, mesic Typic Endoaquults
Marrowbone	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Myra	Loamy-skeletal, mixed (calcareous), mesic Typic Udorthents
Nelse	Coarse-loamy, mixed, nonacid, mesic Mollic Udifluvents
Potomac	Sandy-skeletal, mixed, mesic Typic Udifluvents
Rayne	Fine-loamy, mixed, mesic Typic Hapludults
Rigley	Coarse-loamy, mixed, mesic Typic Hapludults
Sharondale	Loamy-skeletal, mixed, mesic Typic Hapludolls
Shelocta	Fine-loamy, mixed, mesic Typic Hapludults
*Stokly	Coarse-loamy, mixed, acid, mesic Aeric Fluvaquents

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program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

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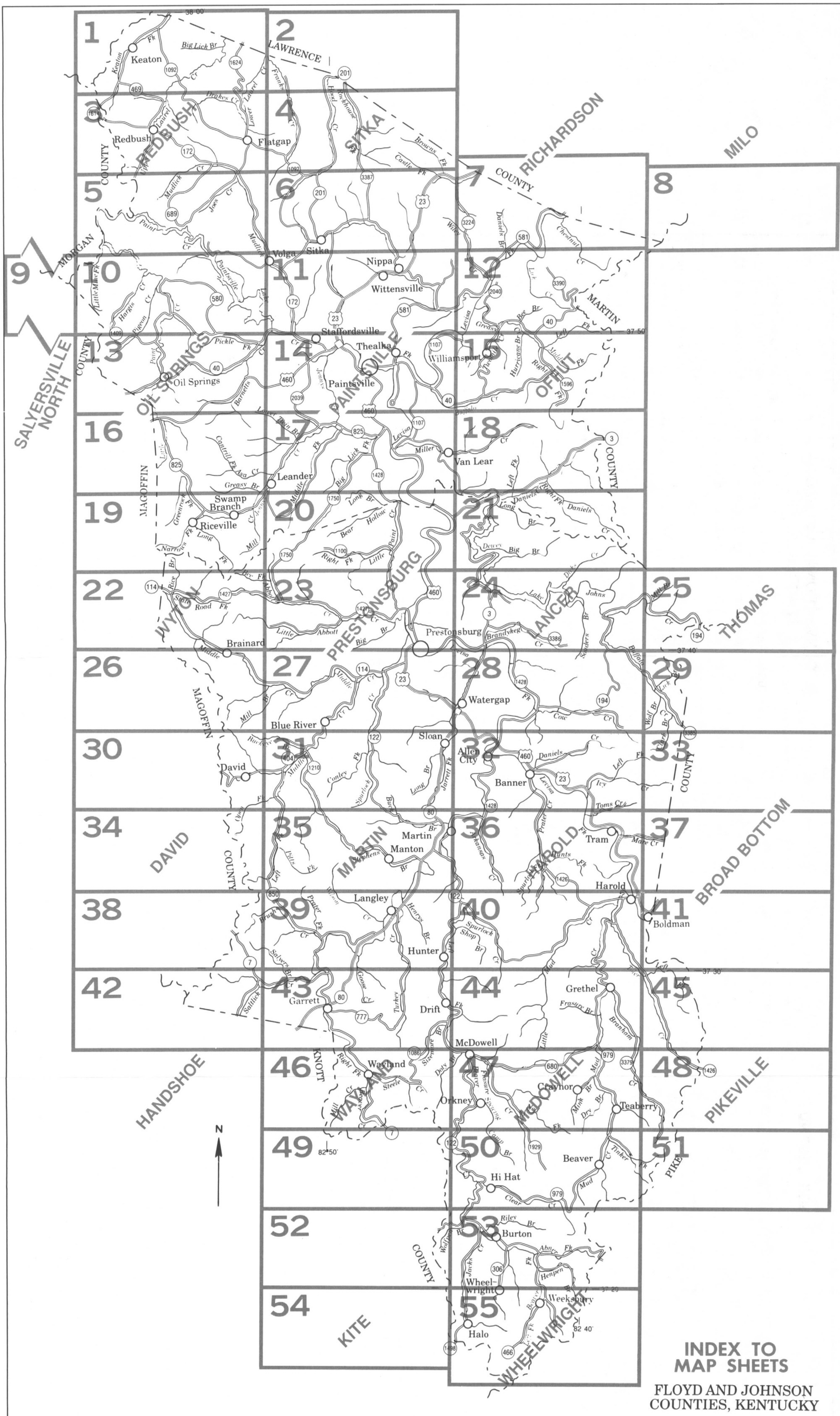


Scale 1:190,080

1 0 1 2 3 Mi

1 0 3 6 Km

Original text from each individual map sheet read:
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1983 – 1984 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL LEGEND

Map symbols consist of letters. The first two symbols represent the kind of soil. A capital letter following these letters indicates the class of slope. Symbols without a slope letter are nearly level soils or miscellaneous areas.

SYMBOL	NAME
AbB	Allegheny loam, 2 to 6 percent slopes, rarely flooded
AeB	Allegheny loam, 2 to 6 percent slopes, occasionally flooded
AeC	Allegheny loam, 6 to 15 percent slopes, occasionally flooded
ChB	Chavies fine sandy loam, 2 to 6 percent slopes, rarely flooded
Co	Cotaco loam, rarely flooded
DgF	Dekalb-Gilpin-Marrowbone complex, 20 to 80 percent slopes, very stony
Dm	Dumps, coal
FbB	Fairpoint-Bethesda complex, 0 to 6 percent slopes
FbD	Fairpoint-Bethesda complex, 6 to 30 percent slopes
FbF	Fairpoint-Bethesda complex, 30 to 70 percent slopes, stony
FsF	Fedscreek-Shelocta complex, 20 to 50 percent slopes
GfF	Gilpin-Fedscreek-Marrowbone complex, 20 to 60 percent slopes
Gr	Grigsby fine sandy loam, occasionally flooded
HkF	Hazleton-Fedscreek-Kimper complex, 30 to 80 percent slopes, very stony
HmF	Hazleton-Fedscreek-Marrowbone complex, 30 to 80 percent slopes, very stony
HsF	Hazleton-Fedscreek-Shelocta complex, 30 to 70 percent slopes, very stony
Kn	Knowlton silt loam, rarely flooded
MyB	Myra very channery fine sandy loam, 0 to 6 percent slopes
MyD	Myra very channery fine sandy loam, 6 to 30 percent slopes
MyF	Myra very channery fine sandy loam, 30 to 70 percent slopes, stony
NeD	Nelse loam, 4 to 25 percent slopes, frequently flooded
PsC	Potomac-Shelocta-Grigsby complex, 2 to 15 percent slopes
RaC	Rayne-Gilpin complex, 6 to 15 percent slopes
RoF	Rigley-Rock outcrop complex, 30 to 70 percent slopes
SaF	Sharondale-Hazleton-Kimper complex, 30 to 80 percent slopes, extremely stony
SeC	Shelocta loam, 6 to 15 percent slopes
ShC	Shelocta-Grigsby-Stokly complex, 2 to 15 percent slopes
St	Stokly fine sandy loam, occasionally flooded
UrC	Udorthents-Urban land complex, 0 to 15 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 173
- Federal — 287
- State — 52
- County, farm or ranch — 1283

RAILROAD Name only

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small (Named where applicable)

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban area) (occupied)
- Church
- School
- Indian mound (label)
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — AeB ChB

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

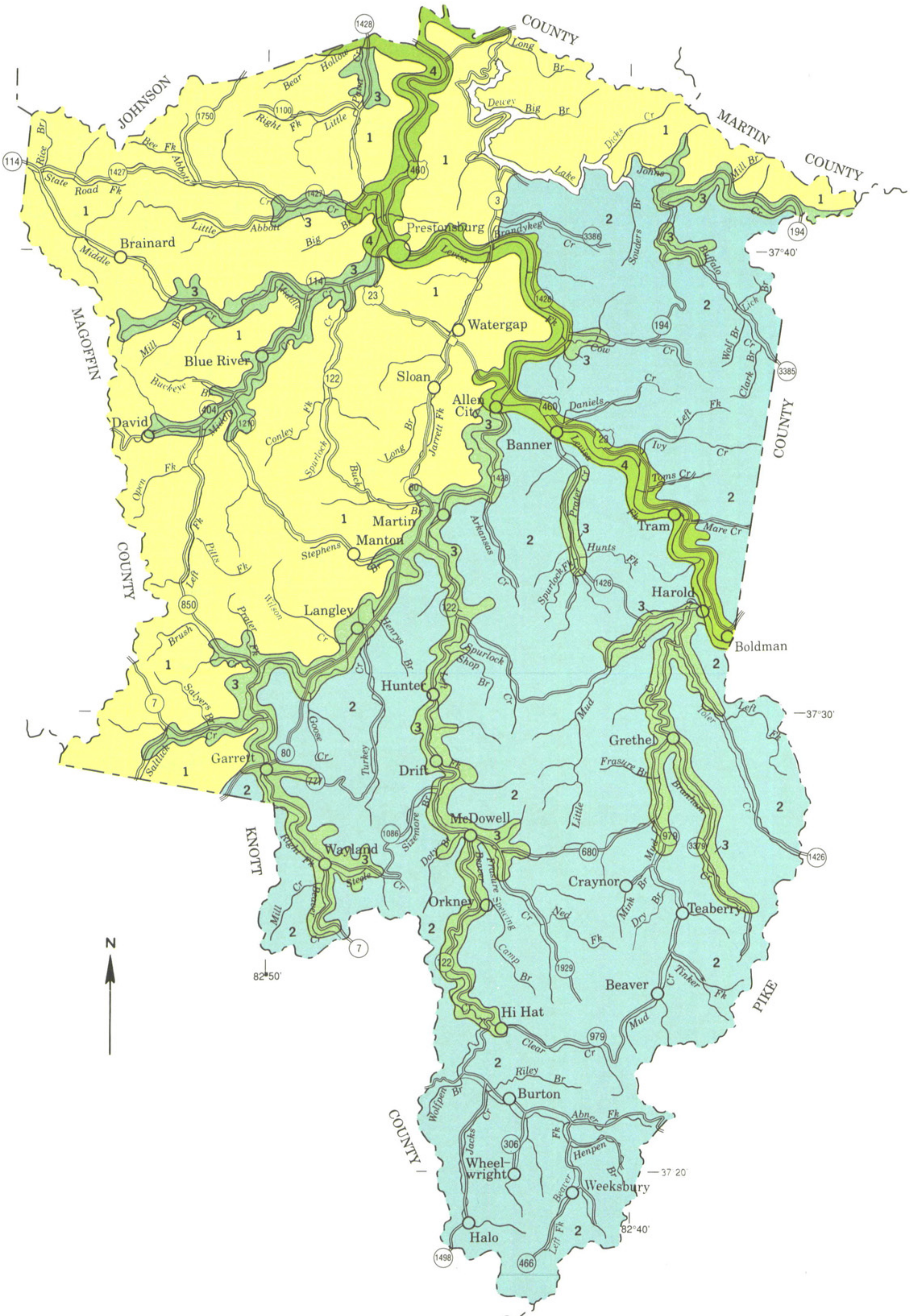
DEPRESSION OR SINK

SOIL SAMPLE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



SOIL LEGEND*

1	HAZELTON-FEDSCREEK-DEKALB-MARROWBONE
2	HAZELTON-SHARONDALE-DEKALB-MARROWBONE
3	GRIGSY-UDORTHENTS-SHELOCTA
4	ALLEGHENY-NELSE-UDORTHENTS

* The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1996

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
KENTUCKY NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
KENTUCKY AGRICULTURAL EXPERIMENT STATION

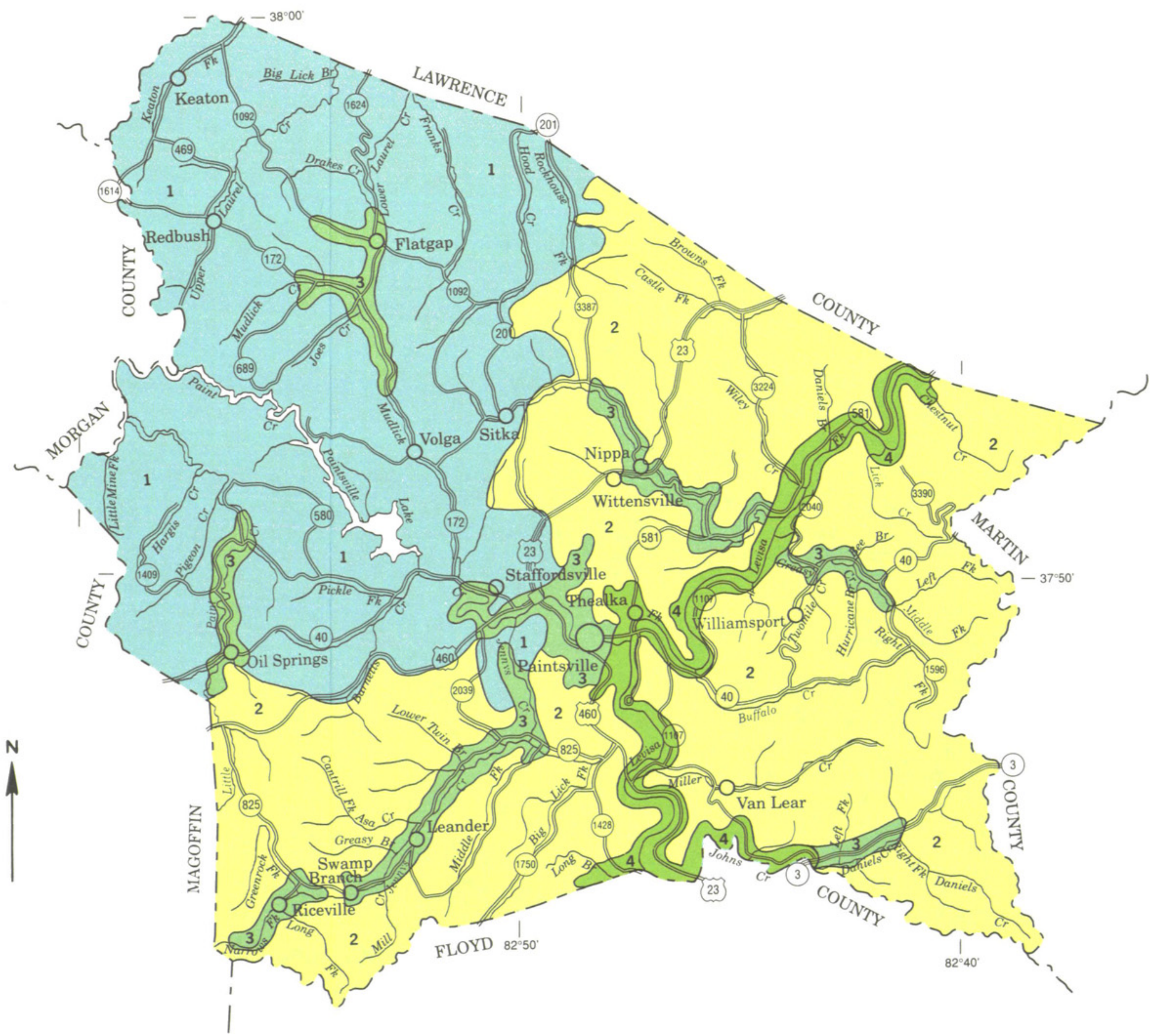
GENERAL SOIL MAP

FLOYD COUNTY, KENTUCKY

Scale 1:190,080

1 0 1 2 3 Mi

1 0 3 6 Km



SOIL LEGEND*

1	FEDSCREEK-HAZLETON-SHELOCTA-GILPIN
2	HAZLETON-FEDSCREEK-DEKALB-MARROWBONE
3	SHELOCTA-GRIGSBY-STOKLY
4	UDORTHENTS-ALLEGHENY-NELSE

* The units on this legend are described in the legend under the heading "General Soil Map Units."

Compiled 1996

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
KENTUCKY NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
KENTUCKY AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

JOHNSON COUNTY, KENTUCKY

Scale 1:190,080

1 0 1 2 3 Mi

1 0 3 6 Km

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

1

N

FLOYD & JOHNSON, KENTUCKY NO. 1

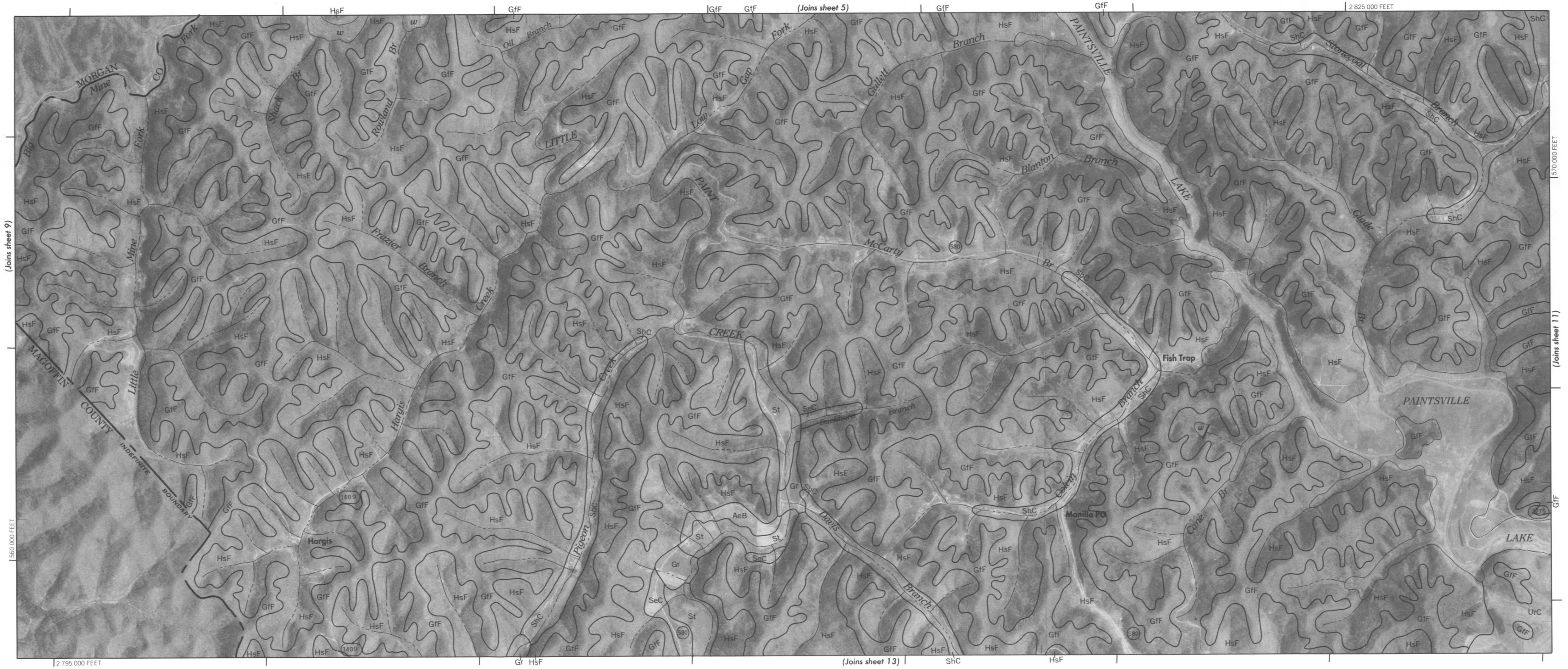
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

10

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

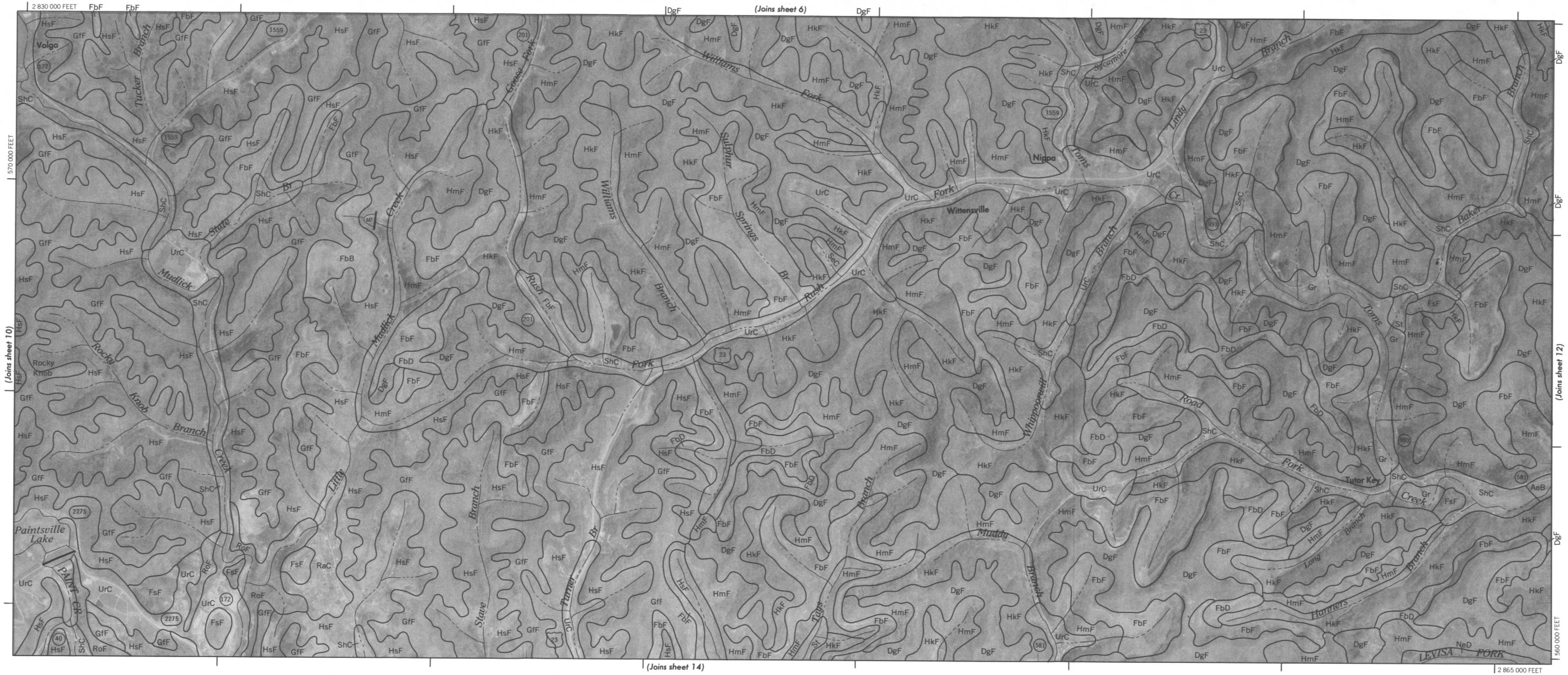
SCALE 1:24 000

FLOYD & JOHNSON, KENTUCKY NO. 10

11

N

FLOYD & JOHNSON, KENTUCKY NO. 11



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

12

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

13

N

FLOYD & JOHNSON, KENTUCKY NO. 13

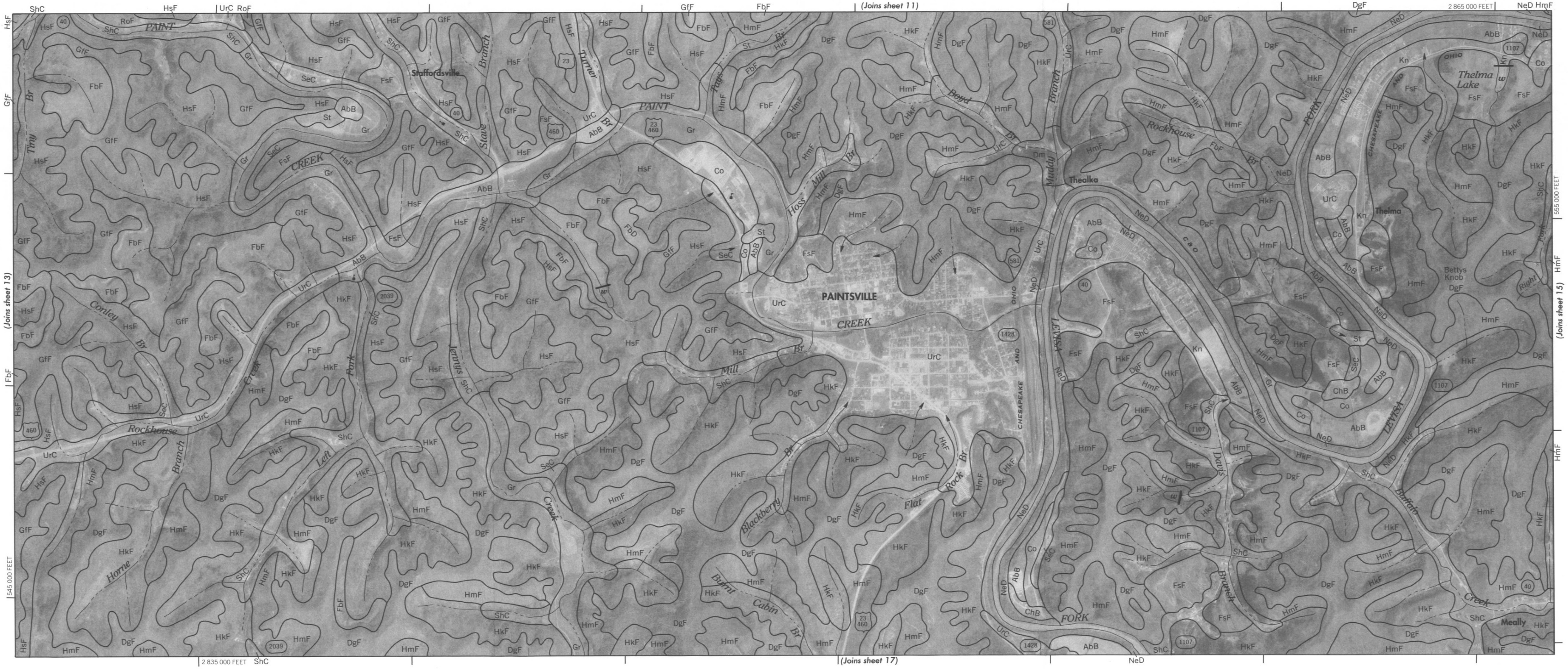
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

14

N



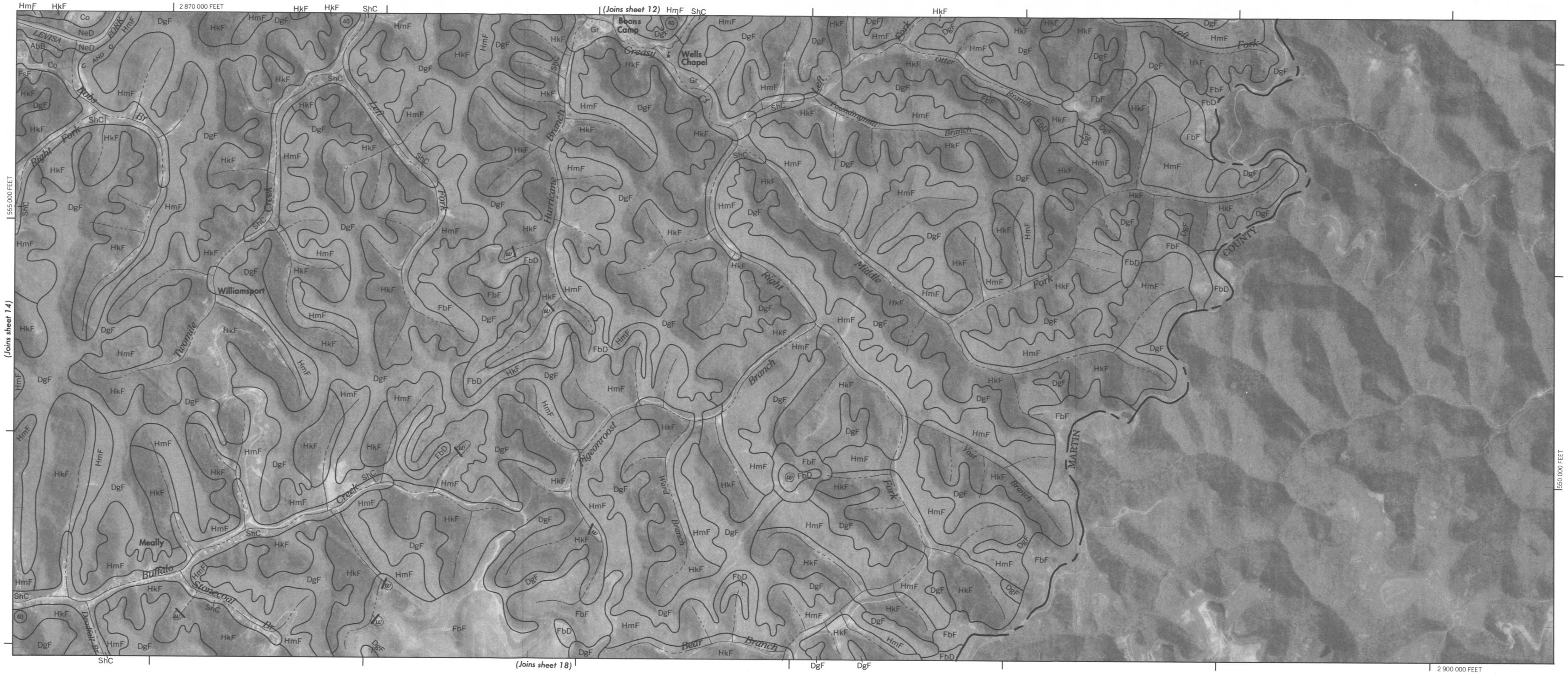
1 | 3/4 | 1/2 | 1/4 | 0 | 1 | 2 MILES

1 | 0.5 | 0 | 1 | 2 KILOMETERS

SCALE 1:24 000

N

FLOYD & JOHNSON, KENTUCKY NO. 15



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

16

N

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

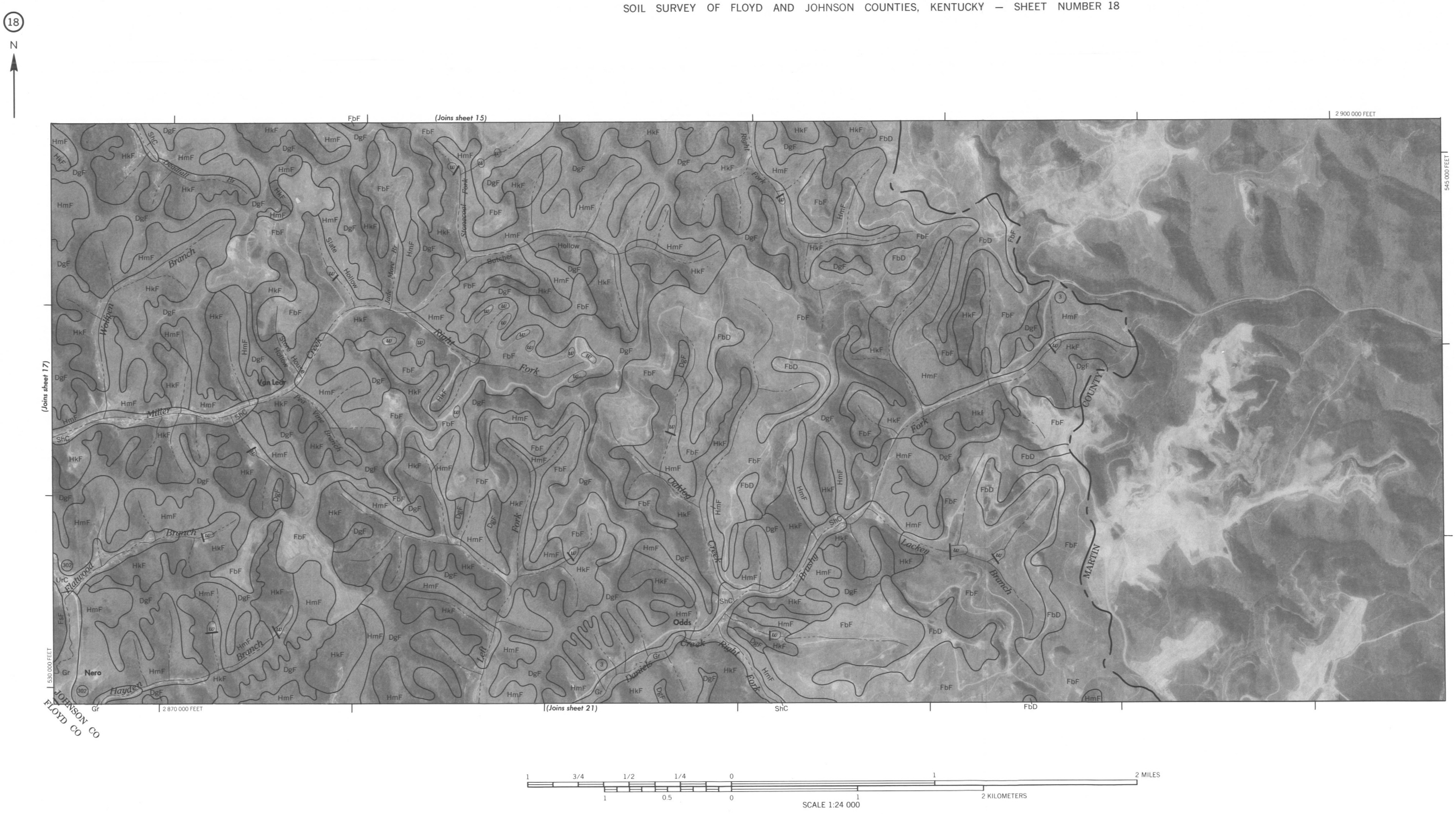
1 0.5 0 1 2 KILOMETERS

N

1 3/4 1/2 1/4 0 1 2 MILES

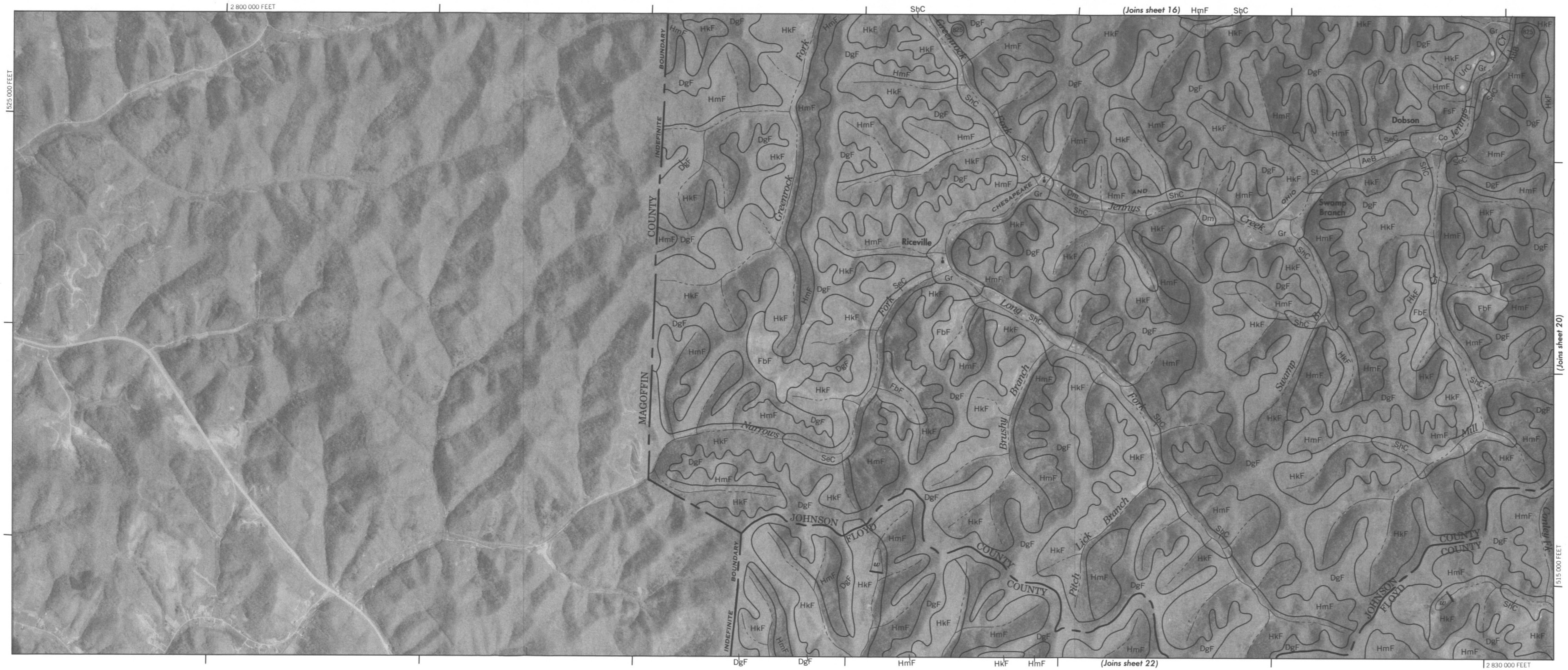
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


18
N
(Joins sheet 15)
(Joins sheet 17)
(Joins sheet 21)
2 900 000 FEET
545 000 FEET
530 000 FEET
2 870 000 FEET
Van Lear
Odds
Nero
Miller
Branch
Right Fork
Oakley Creek
Brushy
Lackey Branch
Daniels Creek
Hayden
Eldwood
MARTIN COUNTY
JOHNSON CO
FLOYD CO
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

19

N



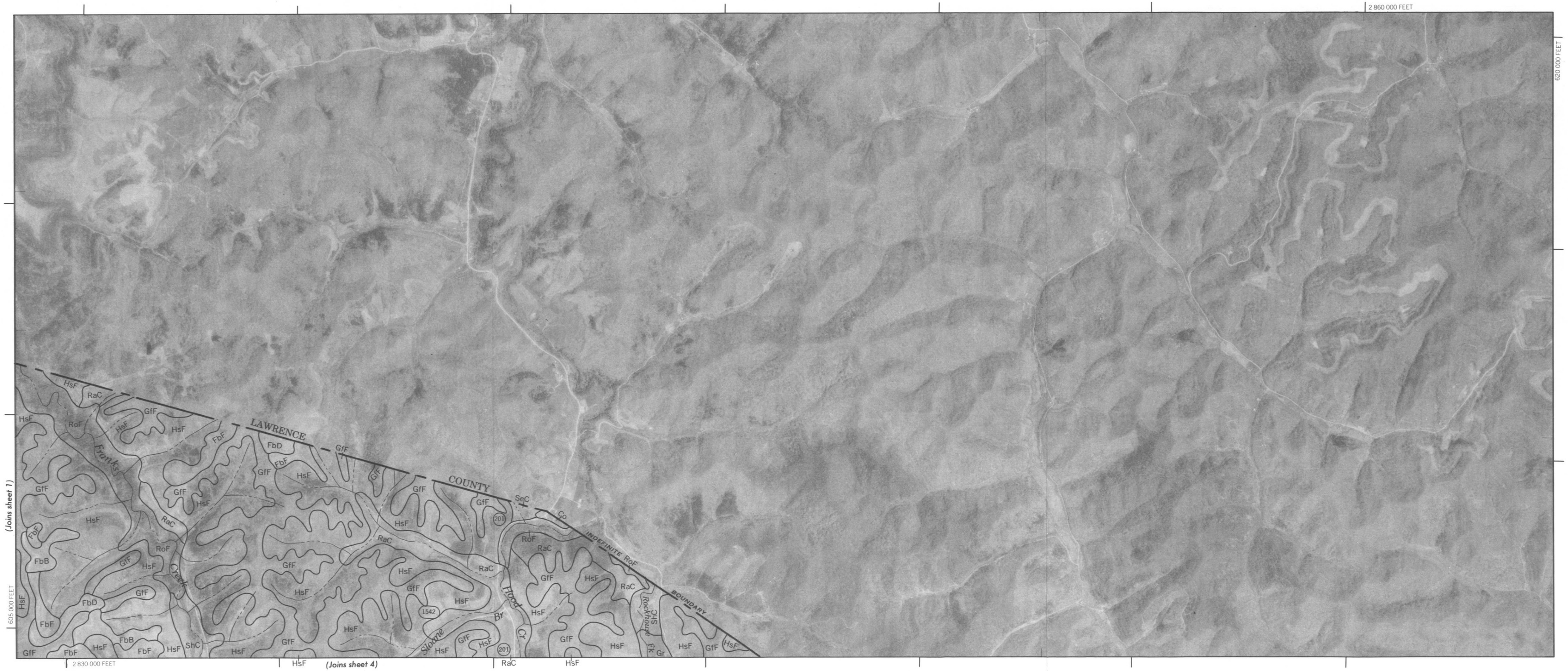
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

2

N



1 3/4 1/2 1/4 0 1 2 MILES

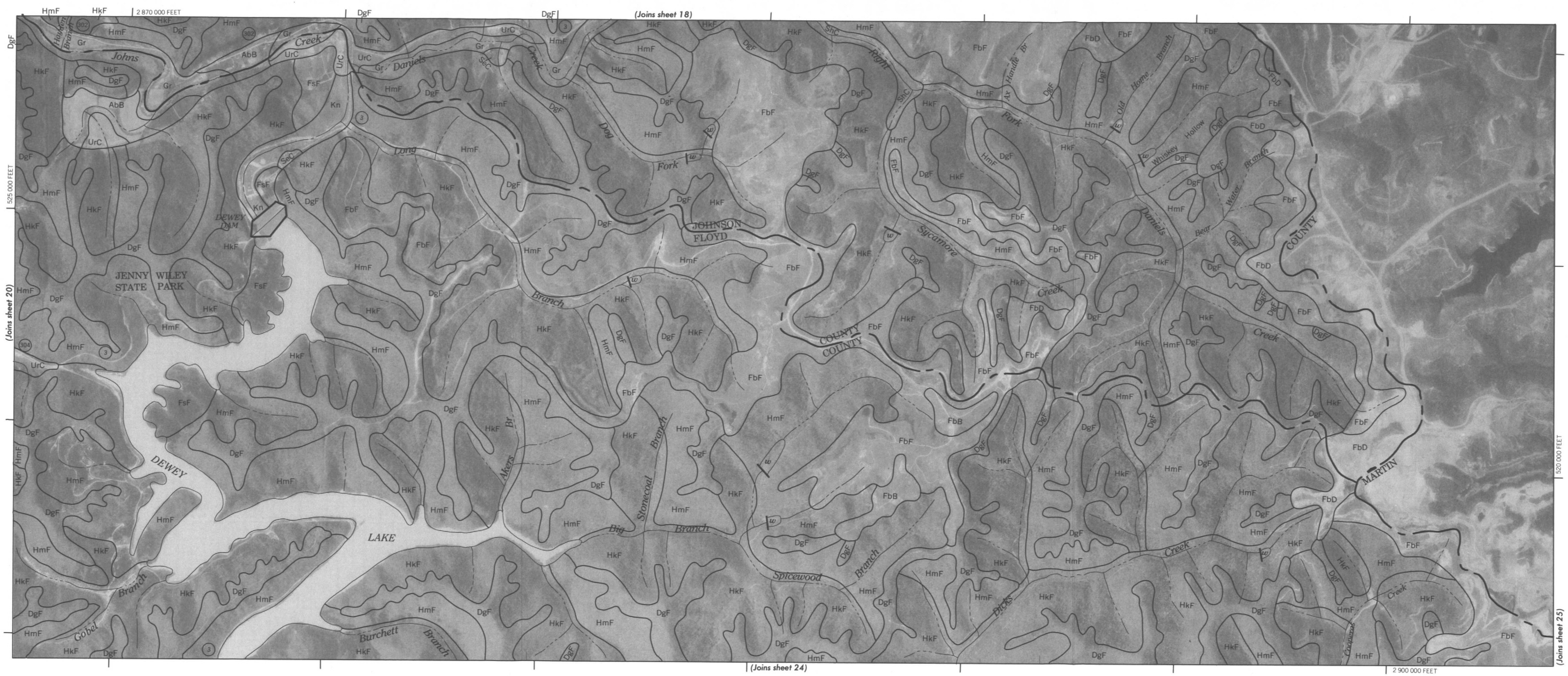
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

20

N

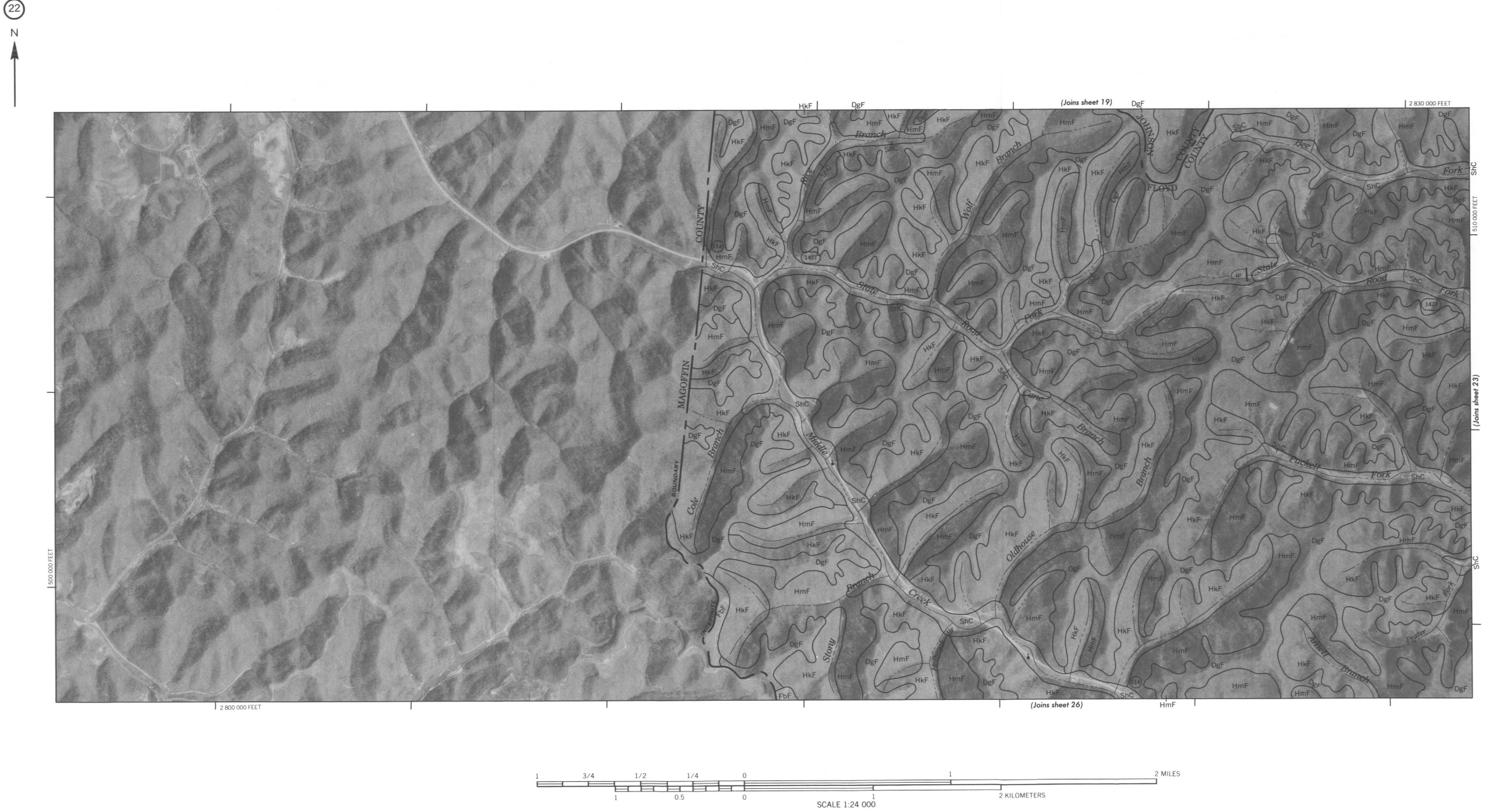
FLOYD & JOHNSON, KENTUCKY NO. 20



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


22
N
(Joins sheet 19)
(Joins sheet 23)
(Joins sheet 26)
2 830 000 FEET
510 000 FEET
500 000 FEET
2 800 000 FEET
MAGOFFIN COUNTY BOUNDARY
JOHNSON COUNTY
FLOYD
Rice Branch
Wolf Branch
Bee Fork
State Road Fork
Middle Fork
Cane Branch
Cole Branch
Branch
Packett Fork
Oldhouse Branch
Stony Branch
Creek
Arnett Branch
Prater Fork
HkF
HmF
DgF
ShC
FbF
114
1427
SCALE 1:24 000
2 MILES
2 KILOMETERS

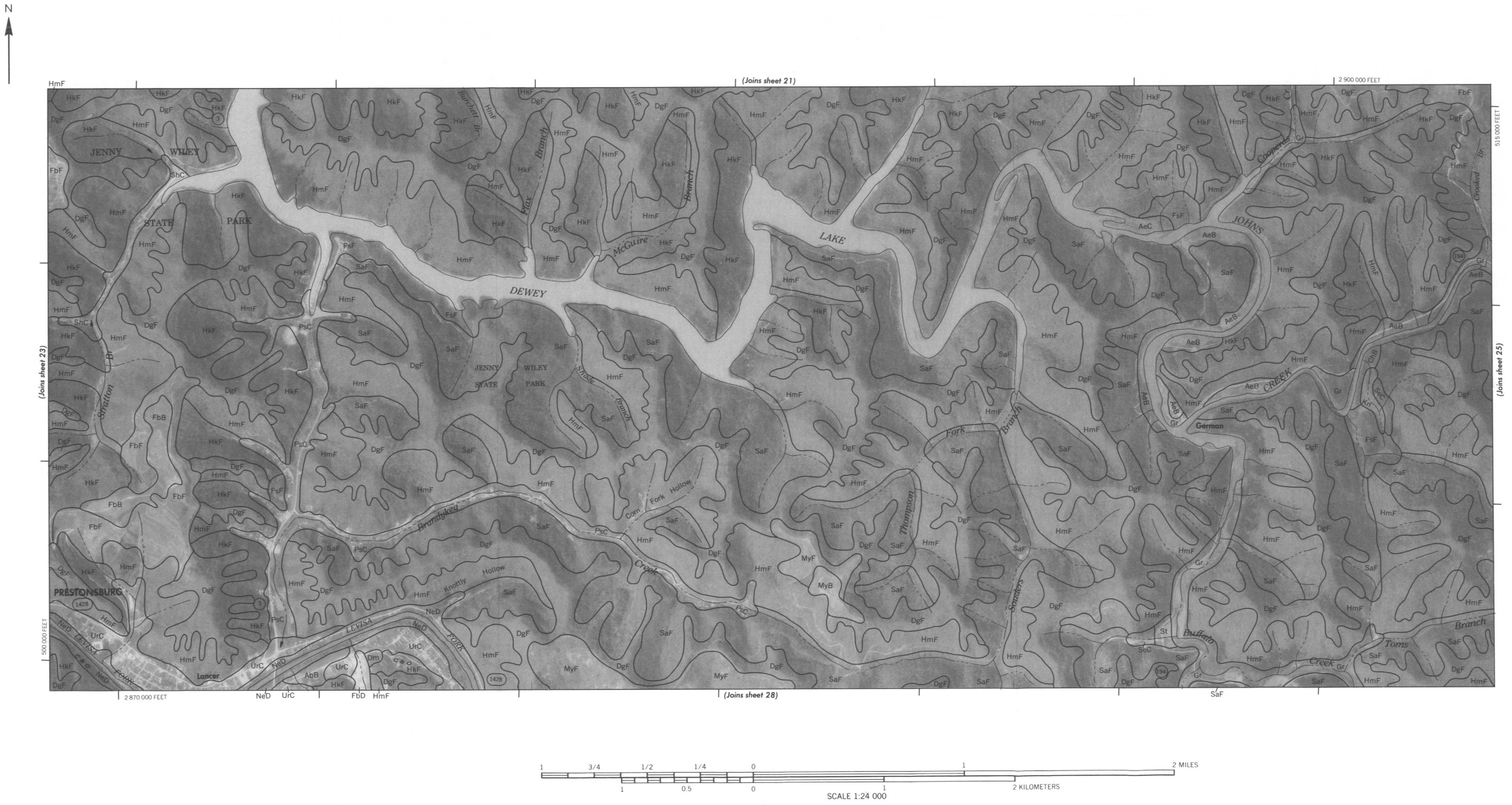
N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

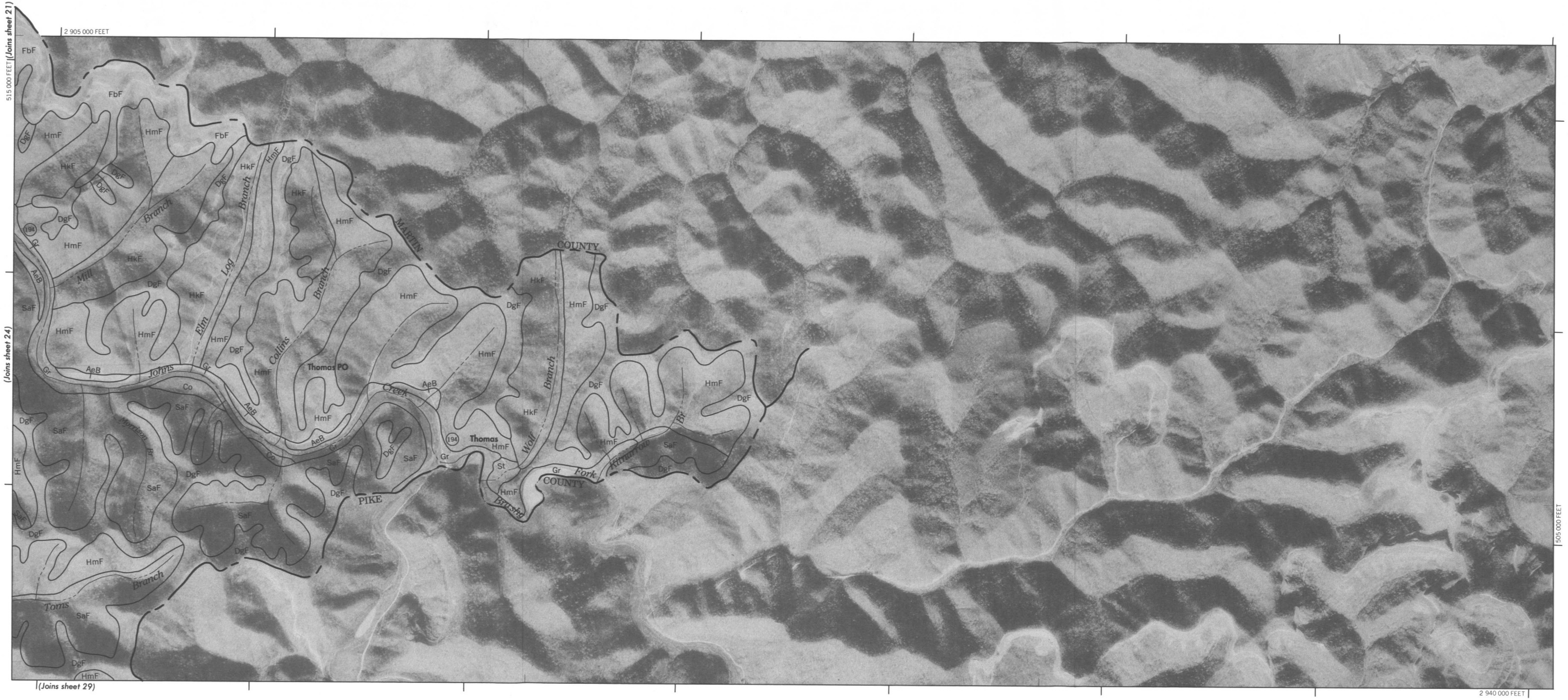
24


N
(Joins sheet 21)
2 900 000 FEET
515 000 FEET
(Joins sheet 23)
(Joins sheet 25)
(Joins sheet 28)
2 870 000 FEET
500 000 FEET
JENNY WILEY STATE PARK
DEWEY LAKE
JOHNS CREEK
PRESTONSBURG
German
Lancer
LEVISA FORK
Brandykeed Creek
Knottly Hollow
Corn Fork Hollow
Fork Branch
Thompson
Sauders
Buffalo Creek
Toms Creek
Branch
Coopers Cr
Crooked Br
Stratton Br
Flax Branch
McGuire Branch
Shade Branch
Burchett Br
1428
194
3
SCALE 1:24 000
2 MILES
2 KILOMETERS

25

N

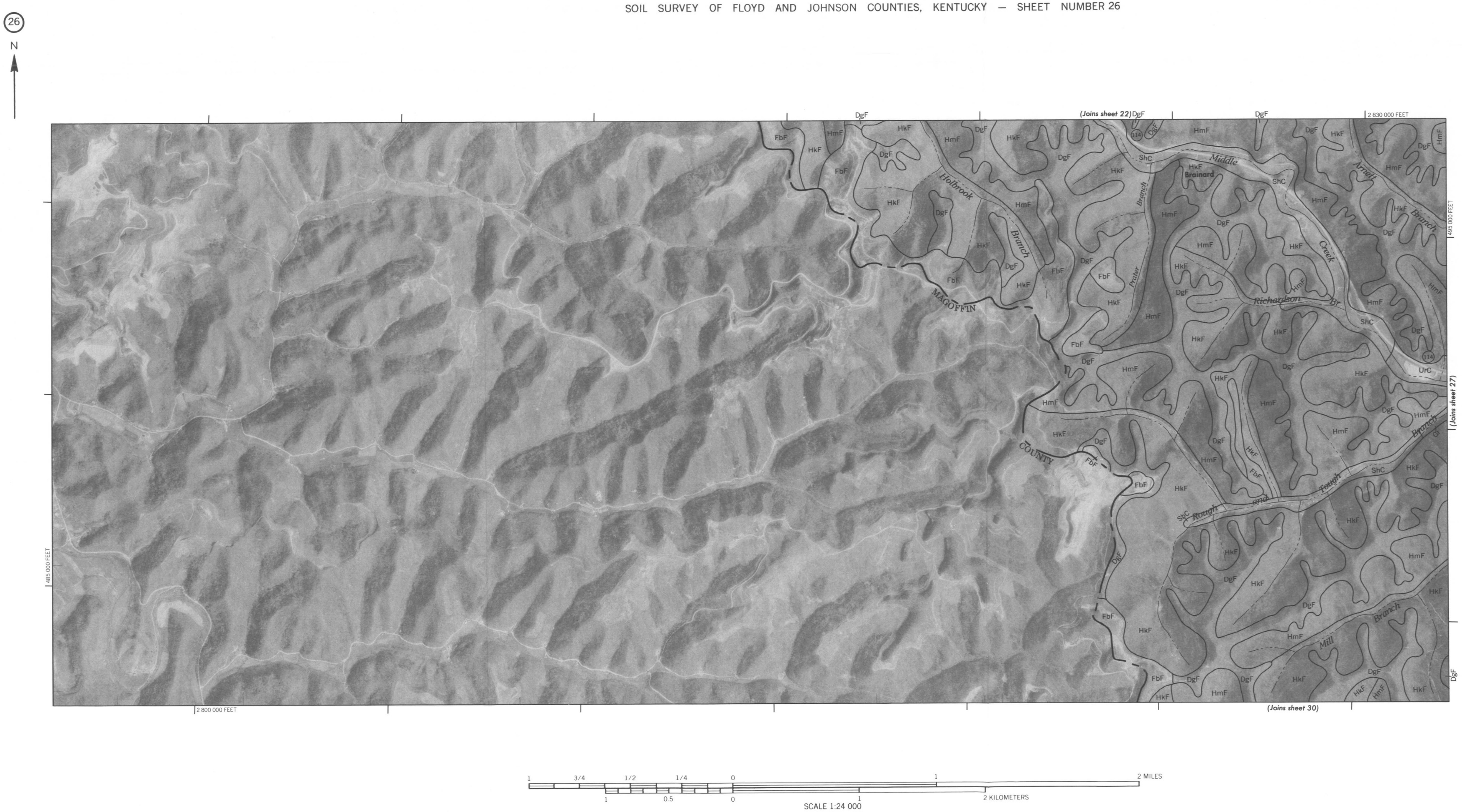
FLOYD & JOHNSON, KENTUCKY NO. 25



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


26
N
(Joins sheet 22)
(Joins sheet 27)
(Joins sheet 30)
2 830 000 FEET
495 000 FEET
485 000 FEET
2 800 000 FEET
MAGOFFIN
COUNTY
Holbrook
Branch
Prater
Branch
Brainard
Middle
Creek
Arnett
Branch
Richardson
Br
Rough
and
Tough
Branch
Mill
Branch
DgF
FbF
HkF
HmF
ShC
UrC
114
SCALE 1:24 000
2 MILES
2 KILOMETERS

27

N

FLOYD & JOHNSON, KENTUCKY NO. 27

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

28

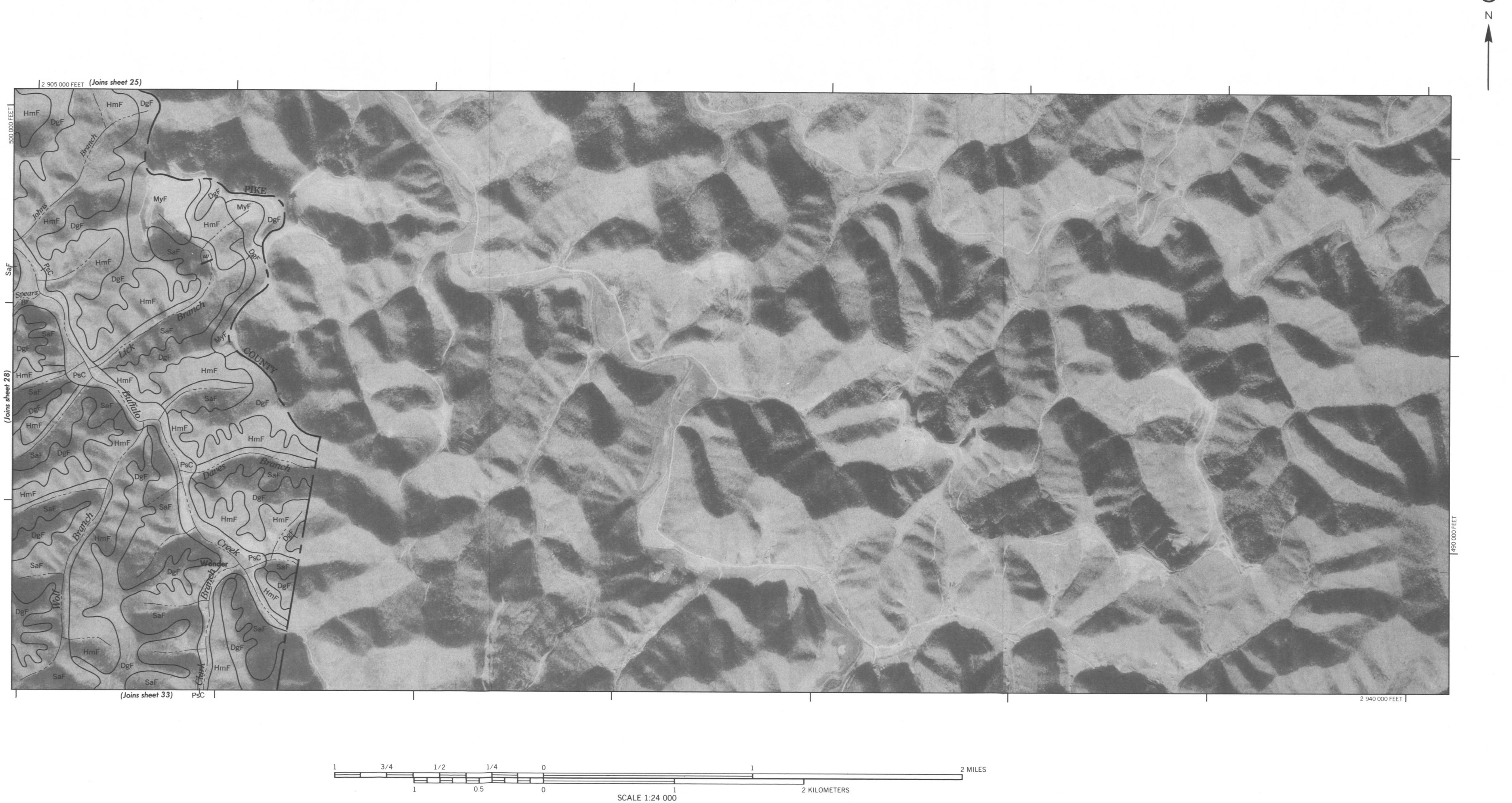
N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

FLOYD & JOHNSON, KENTUCKY NO. 28


29
N
2 905 000 FEET
(Joins sheet 25)
500 000 FEET
(Joins sheet 28)
(Joins sheet 33)
490 000 FEET
2 940 000 FEET
PIKE
COUNTY
Johns
Branch
Spears Br
Lick
Branch
Buffalo
Daves
Branch
Creek
Wonder
Branch
Wolf
Branch
Clark
HmF
DgF
MyF
SaF
PsC
w
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

3

N

FLOYD & JOHNSON, KENTUCKY NO. 3

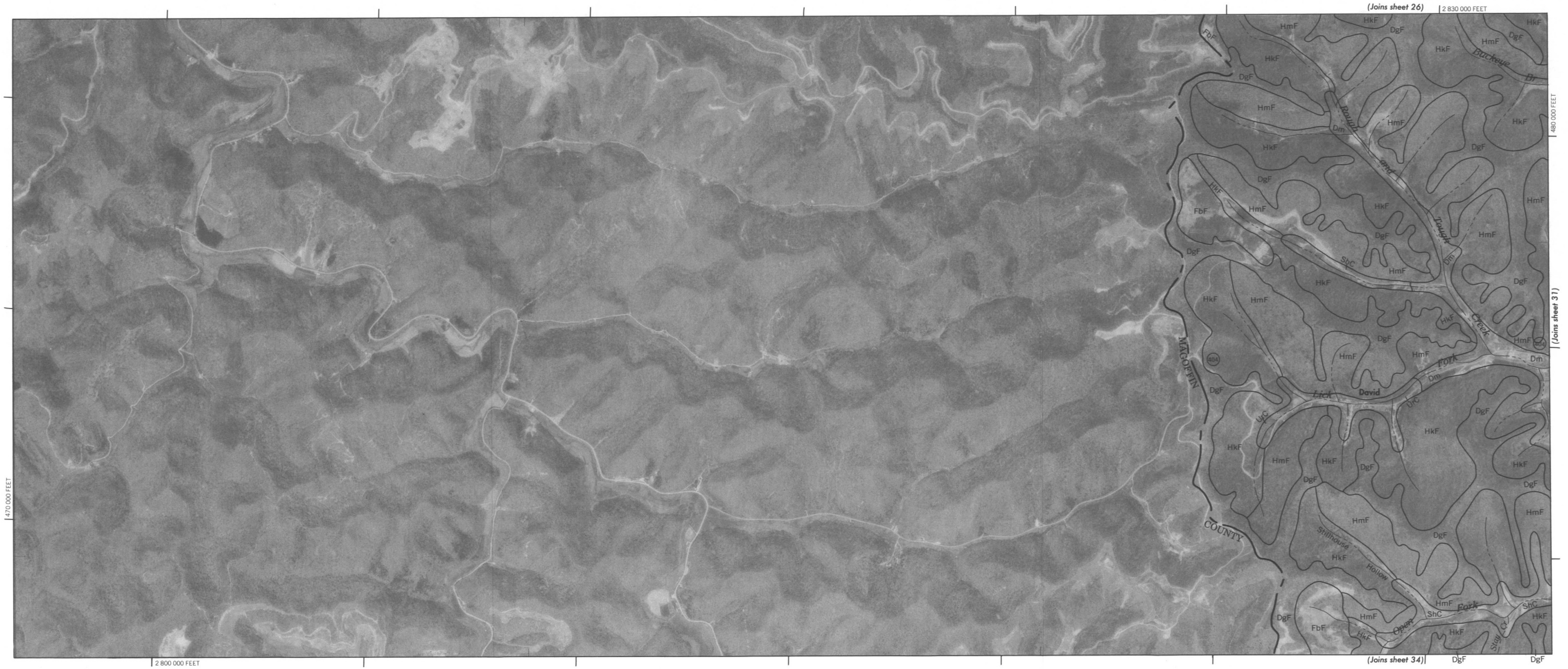
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

30

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

31

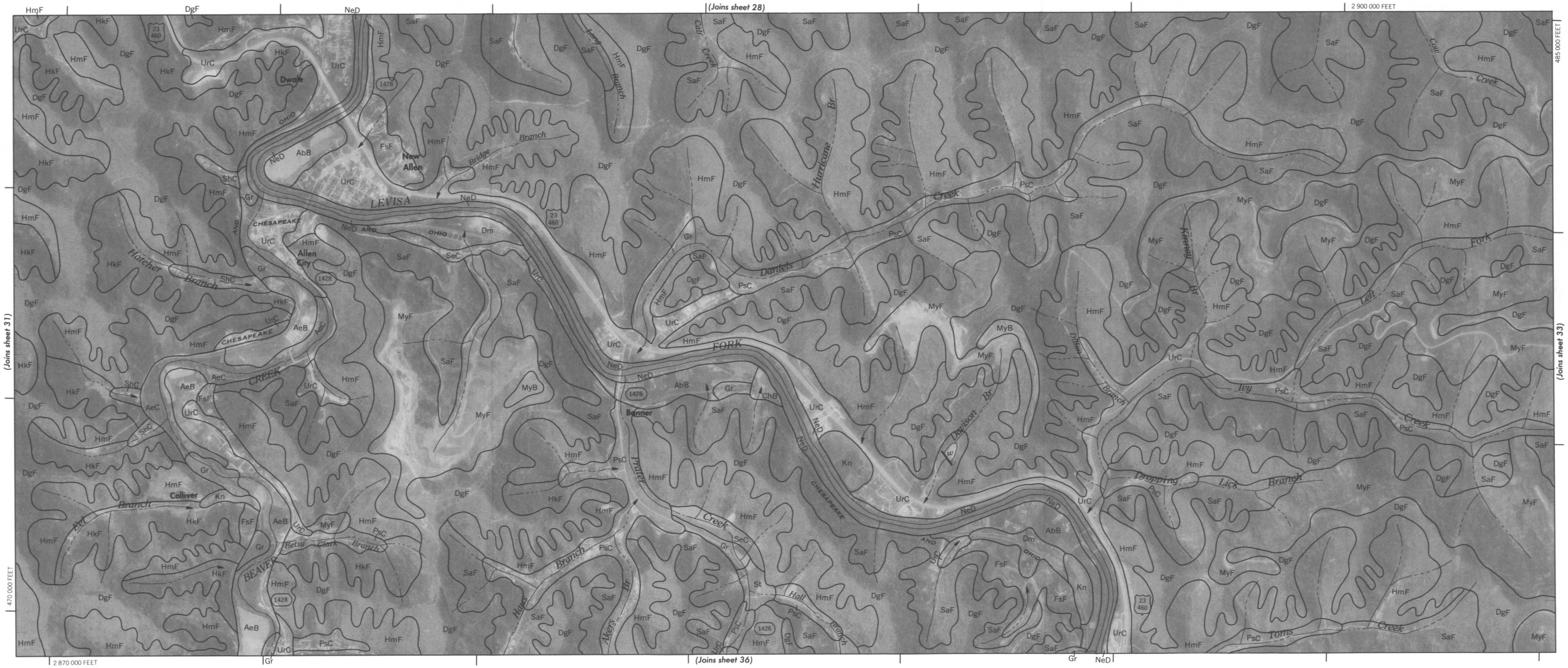
N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

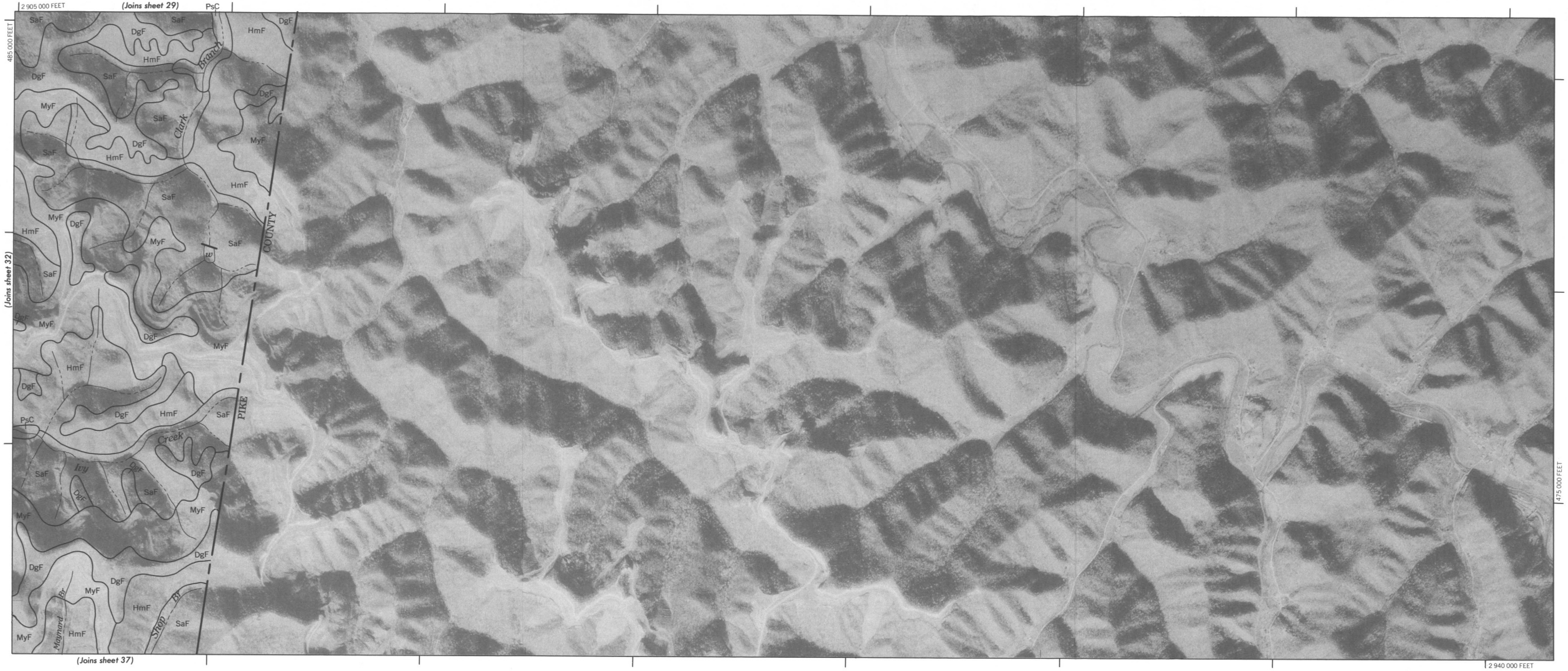
SCALE 1:24 000

FLOYD & JOHNSON, KENTUCKY NO. 32

33

N

FLOYD & JOHNSON, KENTUCKY NO. 33



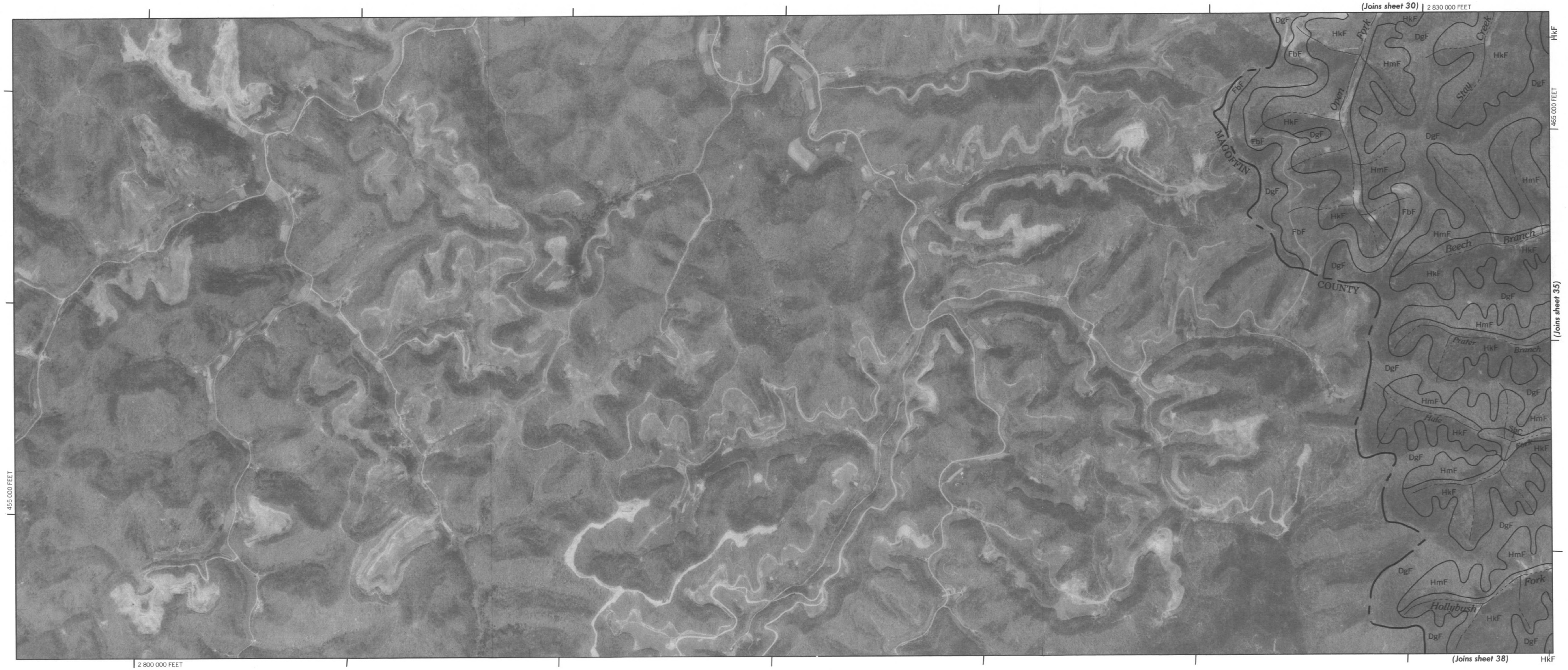
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

SOIL SURVEY OF FLOYD AND JOHNSON COUNTIES, KENTUCKY — SHEET NUMBER 34

N

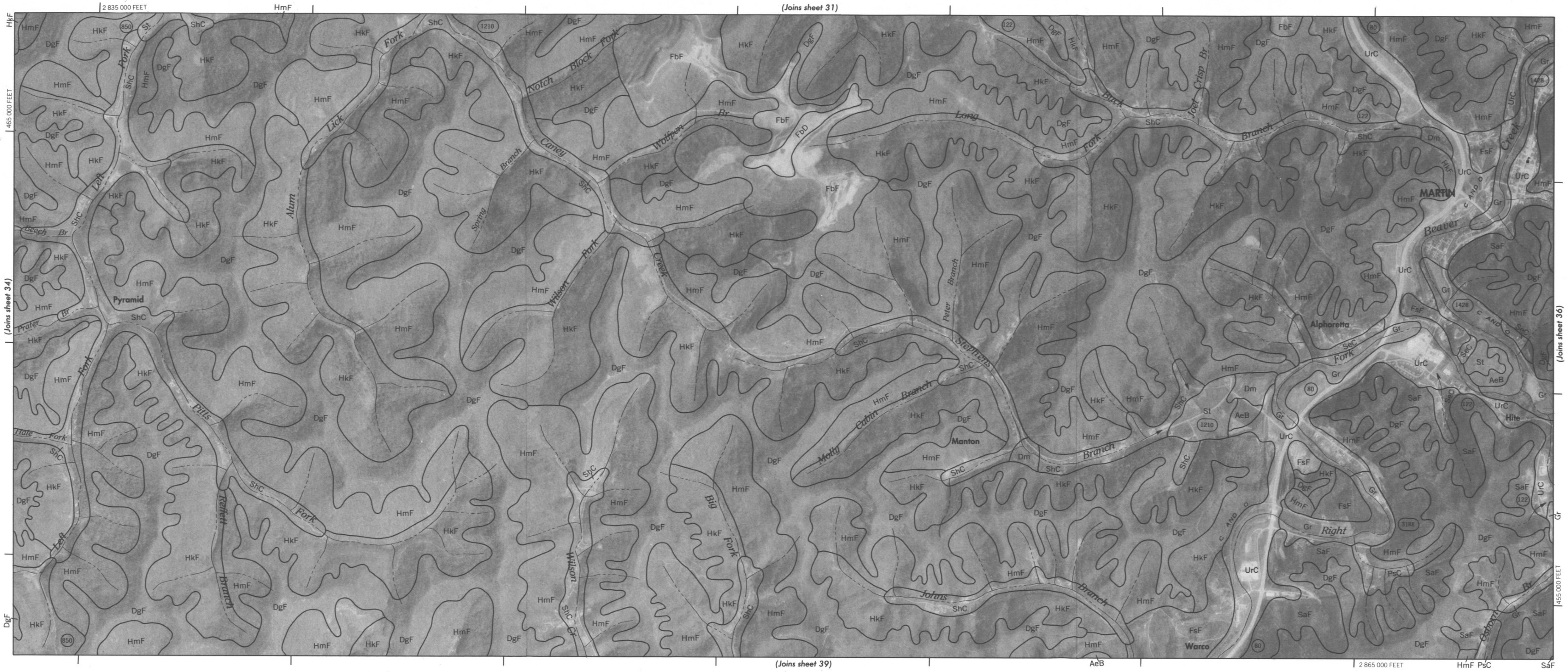


1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

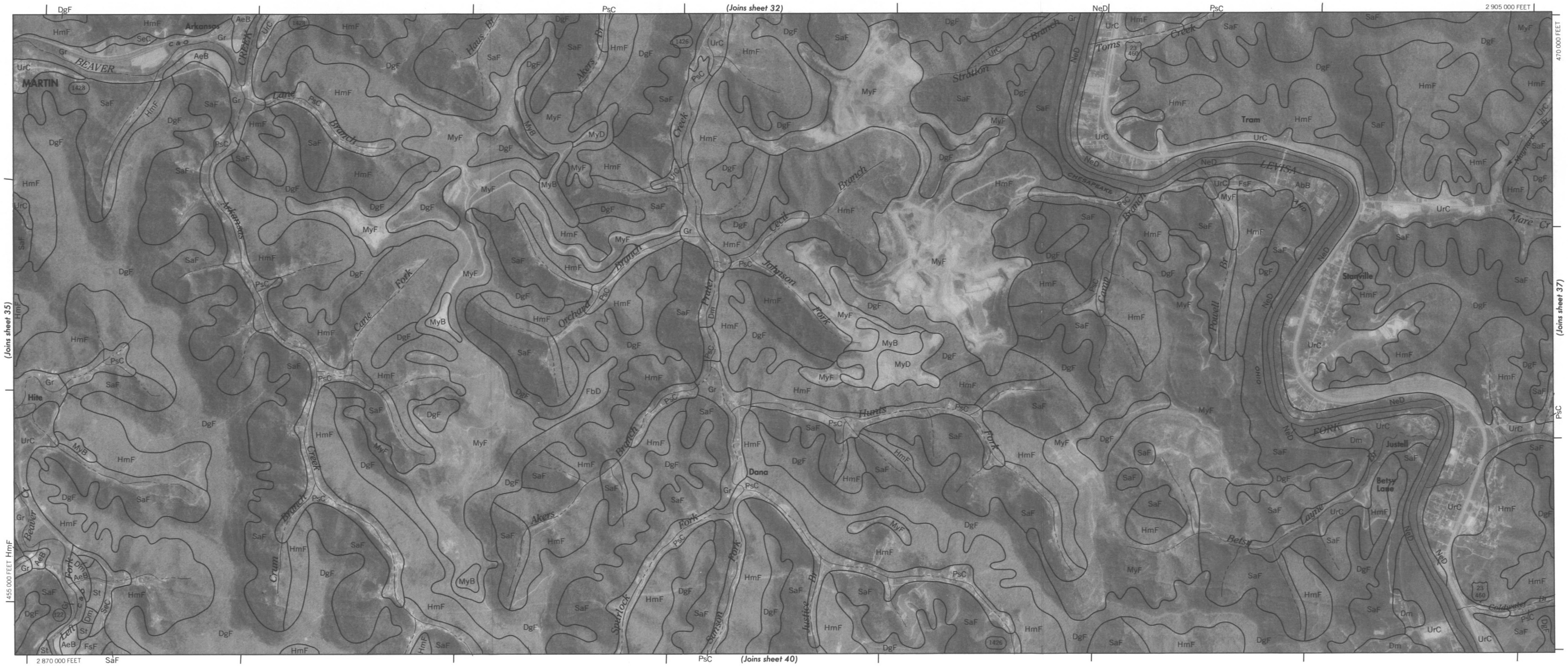
SCALE 1:24 000

35



1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N



FLOYD & JOHNSON, KENTUCKY NO. 36

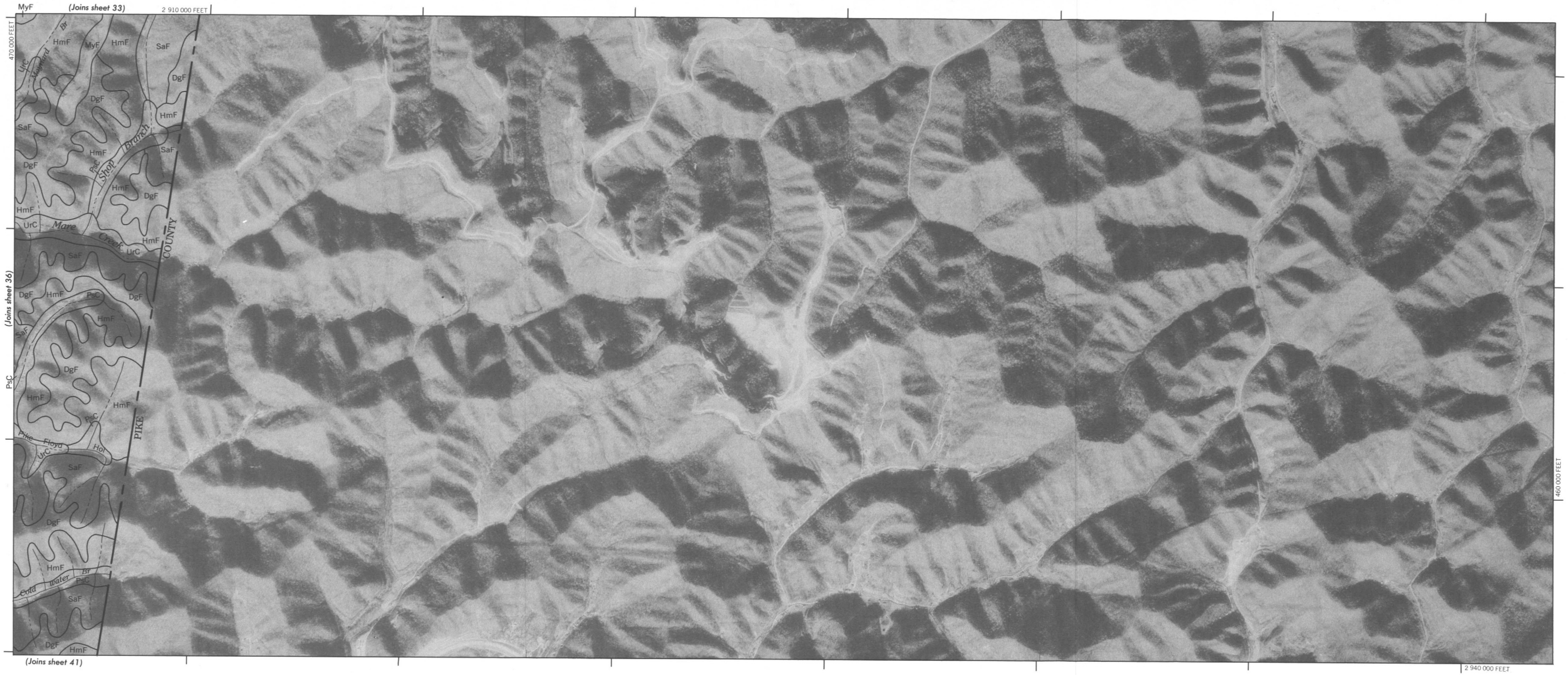
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

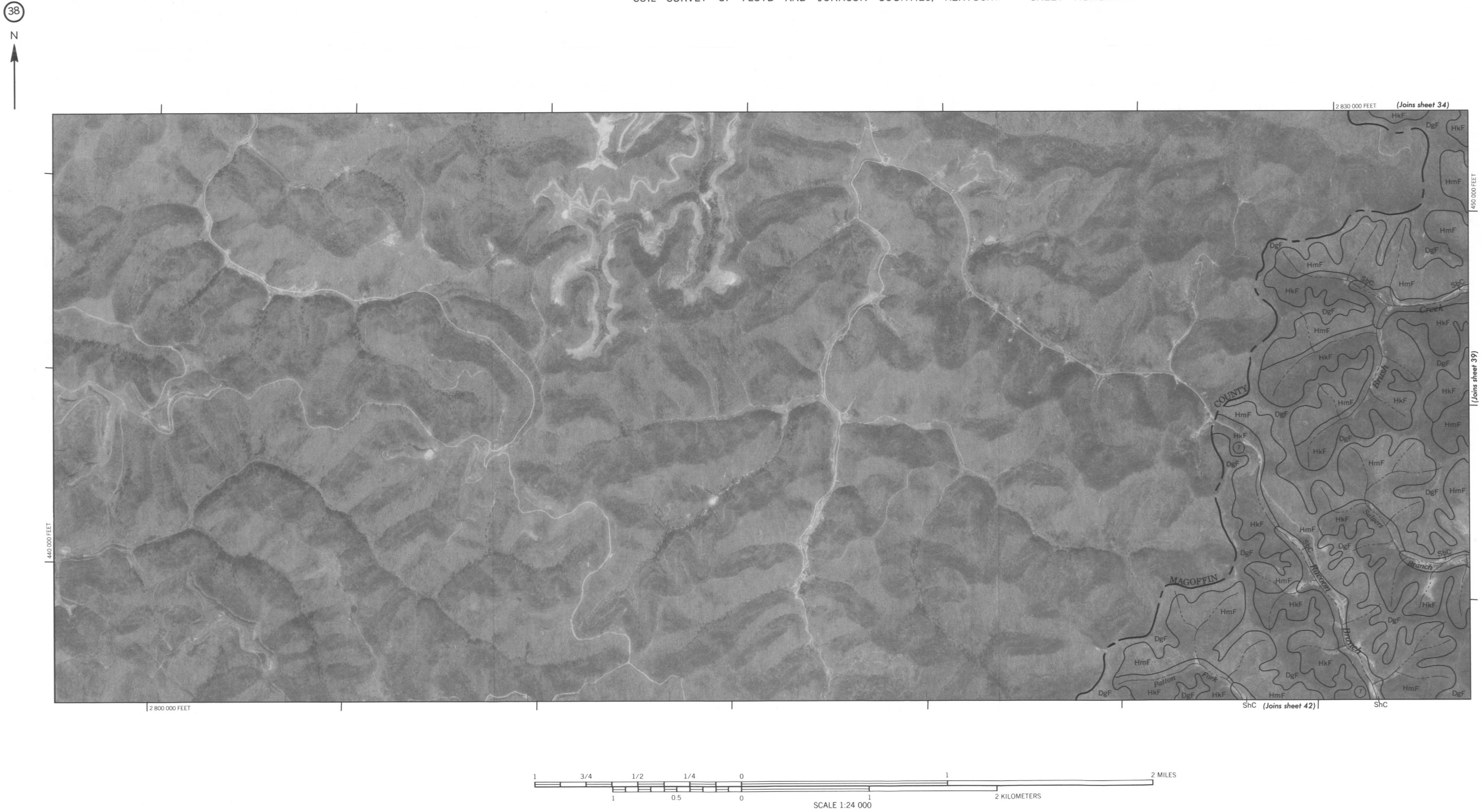
FLOYD & JOHNSON, KENTUCKY NO. 37



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


38
N
2 830 000 FEET
(Joins sheet 34)
450 000 FEET
(Joins sheet 39)
440 000 FEET
2 800 000 FEET
(Joins sheet 42)
MAGOFFIN
COUNTY
Creek
Brush
Raccoon
Branch
Patton
Fork
HkF
HmF
DgF
ShC
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

39

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

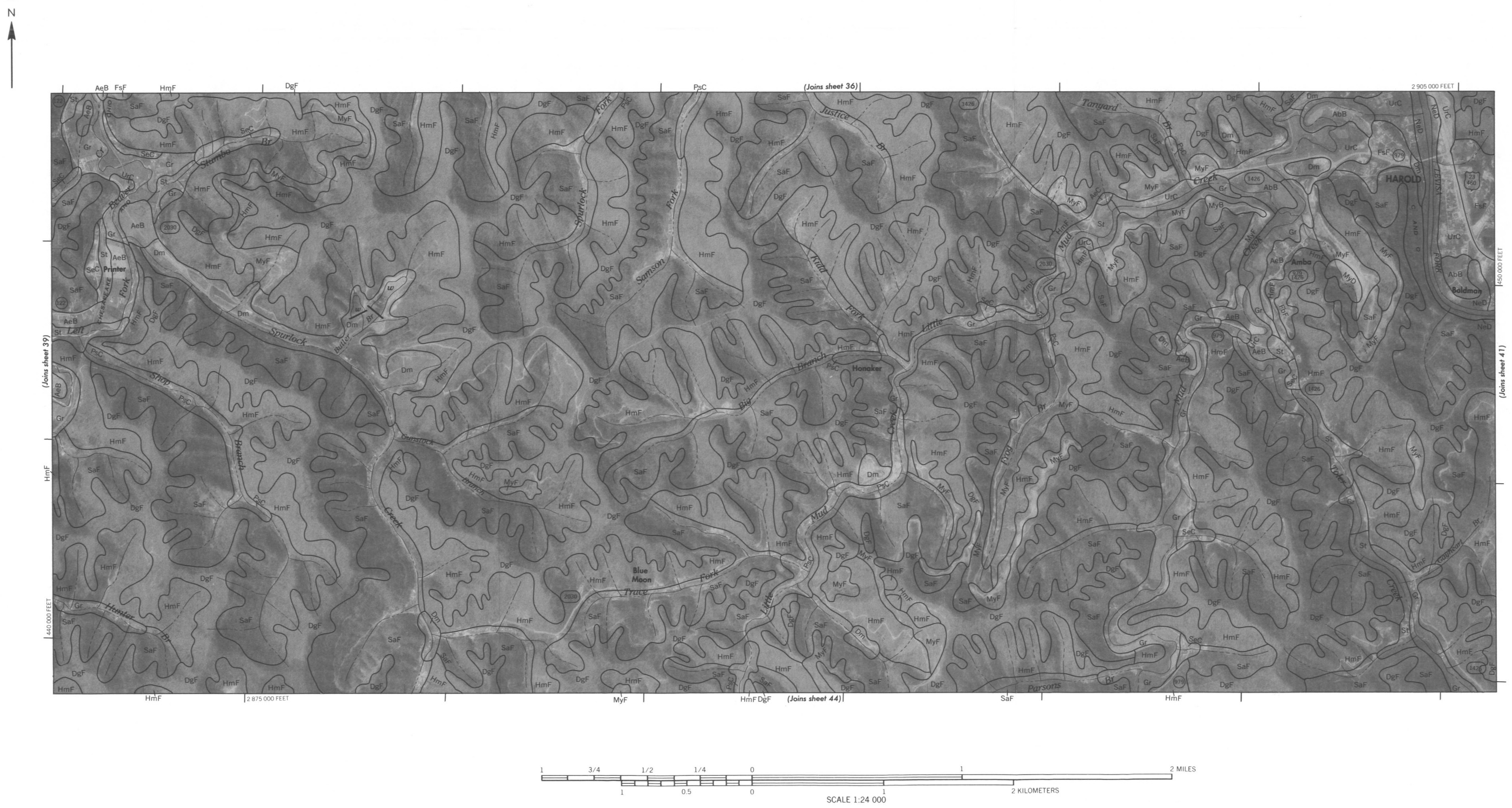
4

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


N
(Joins sheet 36)
(Joins sheet 39)
(Joins sheet 41)
(Joins sheet 44)
2 905 000 FEET
2 875 000 FEET
450 000 FEET
440 000 FEET
HAROLD
Printer
Honaker
Blue Moon
Amba
Boldman
Spurlock Creek
Mud Creek
Little Mud Creek
Big Branch
Samson Fork
Justice Br
Tanyard Br
Kidd Fork
Stumbo Br
Shop Branch
Hunter Br
Parsons Br
Trace Fork
Frog Br
Toler Creek
Butler Br
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

41

N

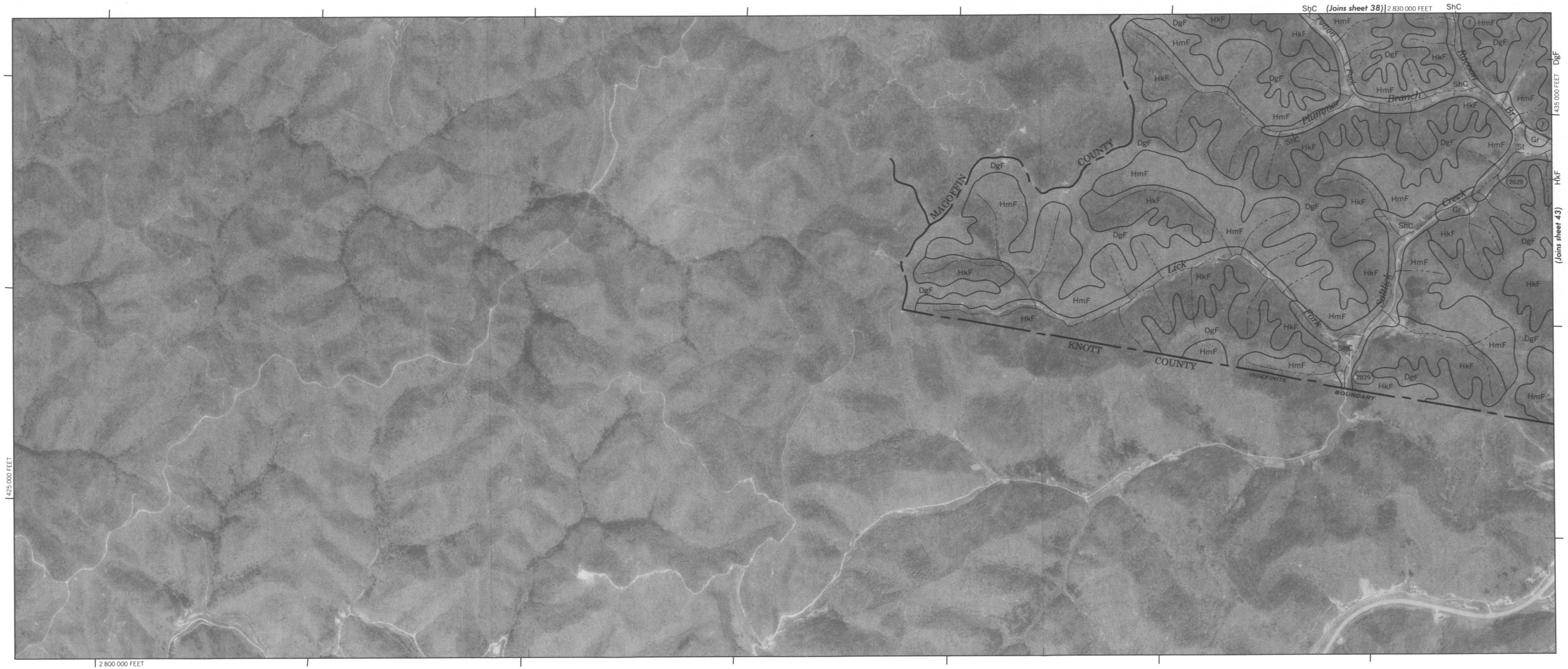
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

SOIL SURVEY OF FLOYD AND JOHNSON COUNTIES, KENTUCKY — SHEET NUMBER 42

N



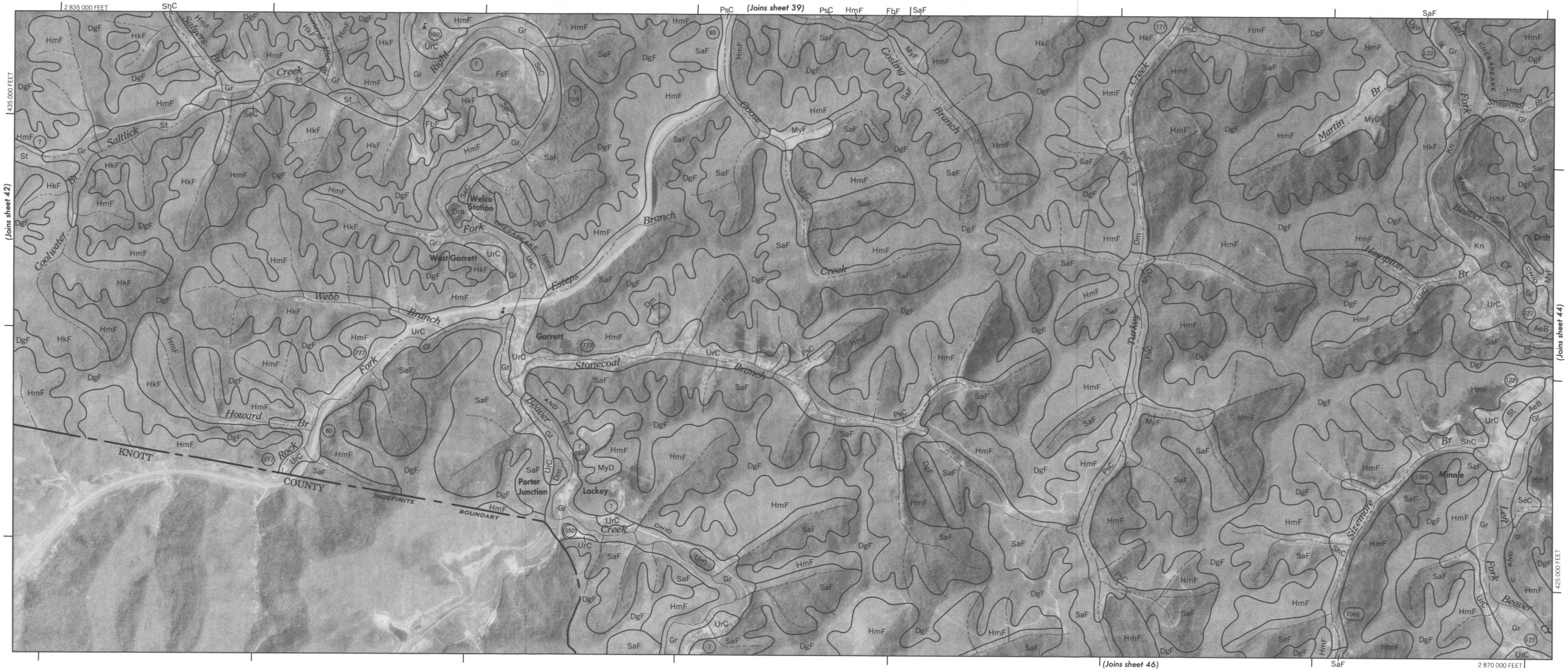
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

FLOYD & JOHNSON, KENTUCKY NO. 43



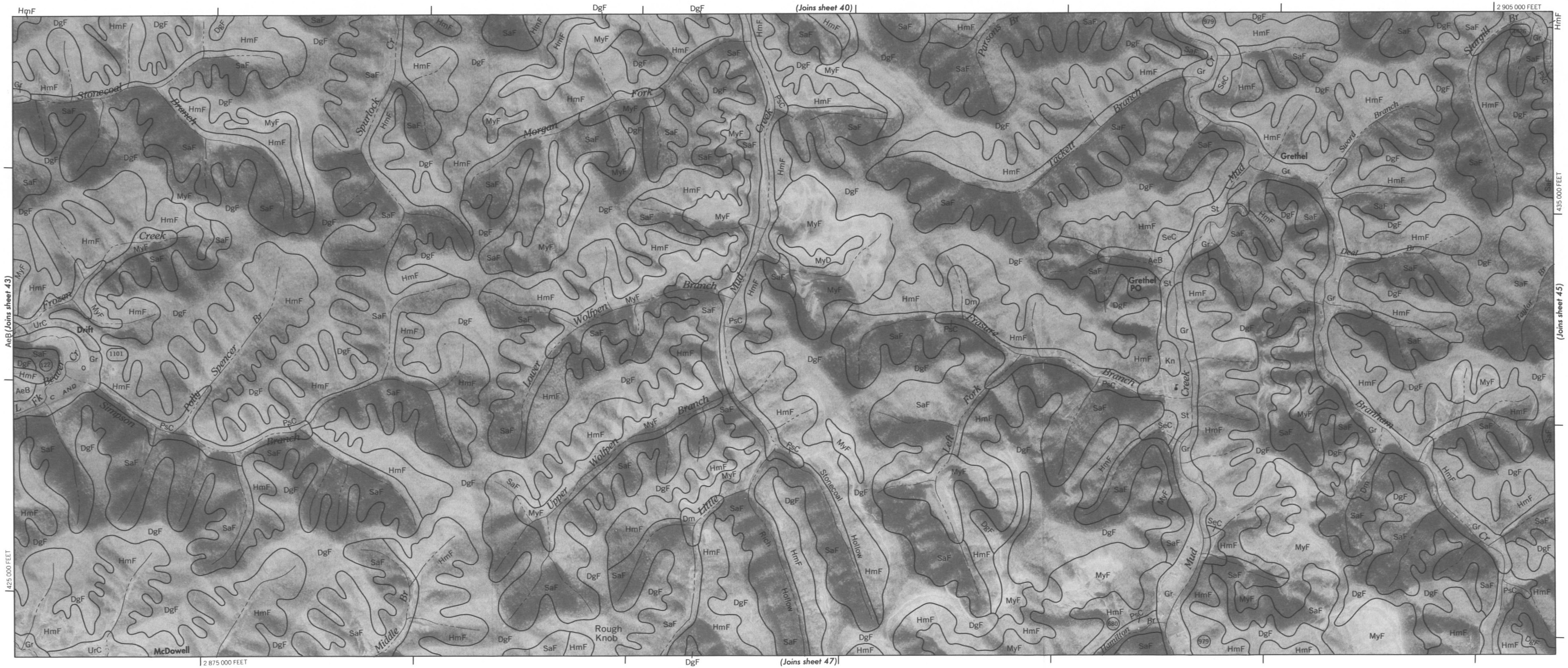
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

44

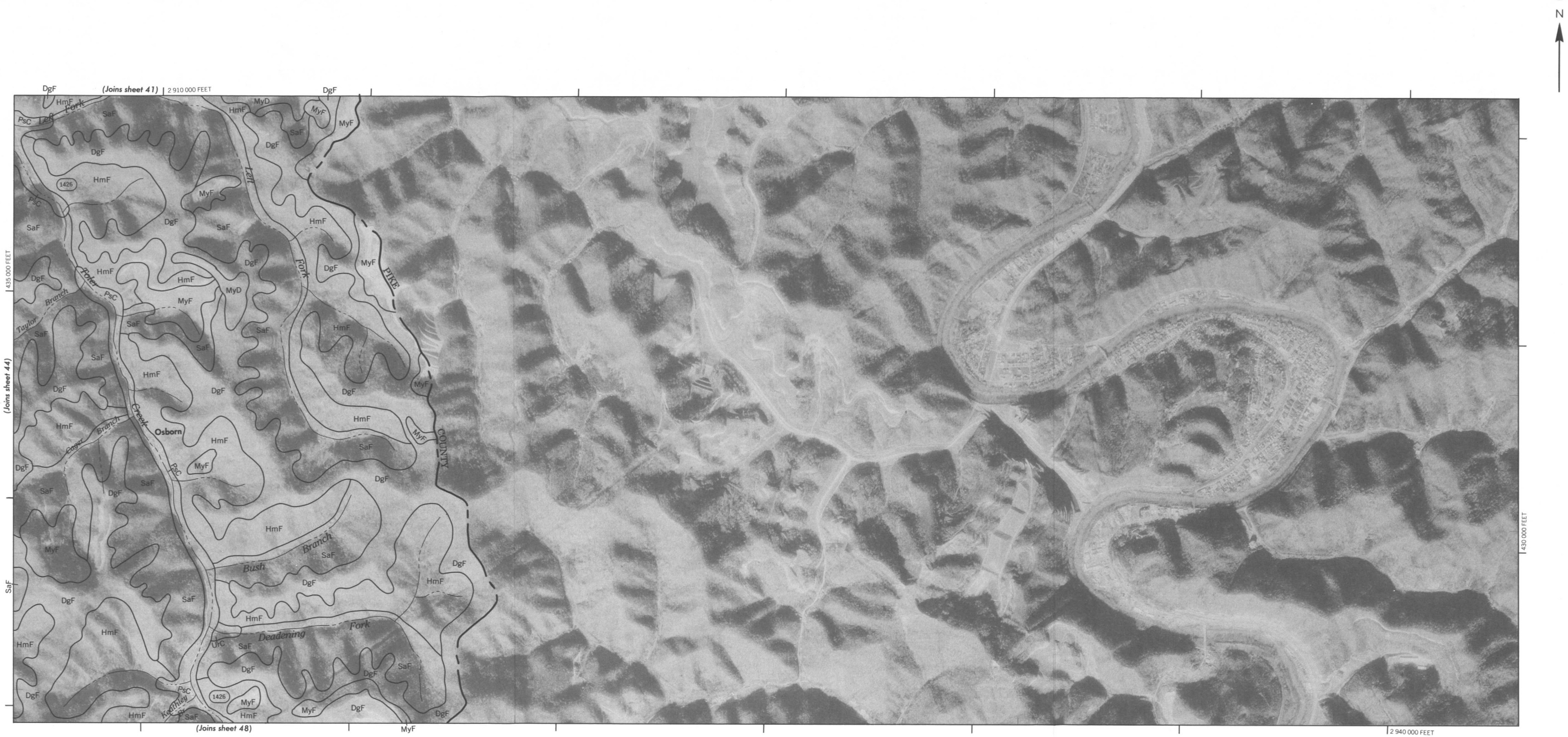
N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

46

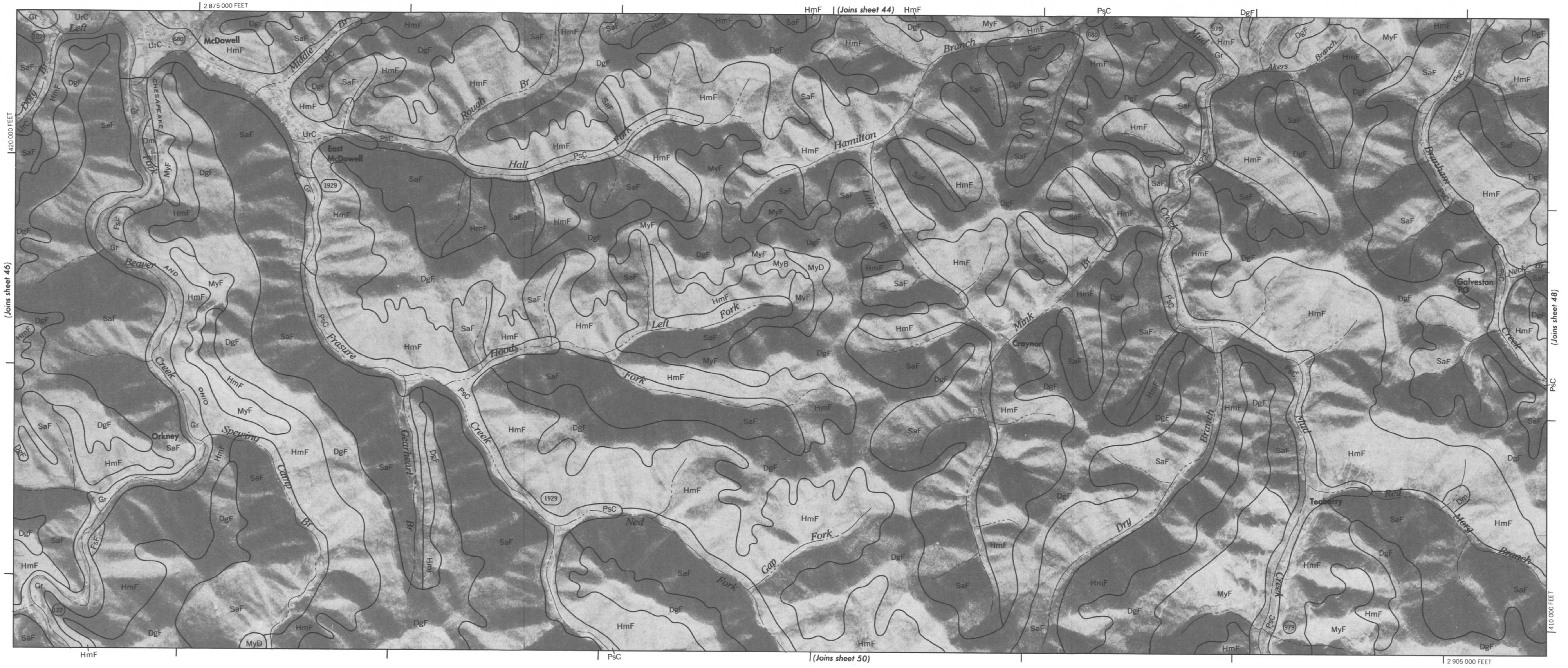
N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N



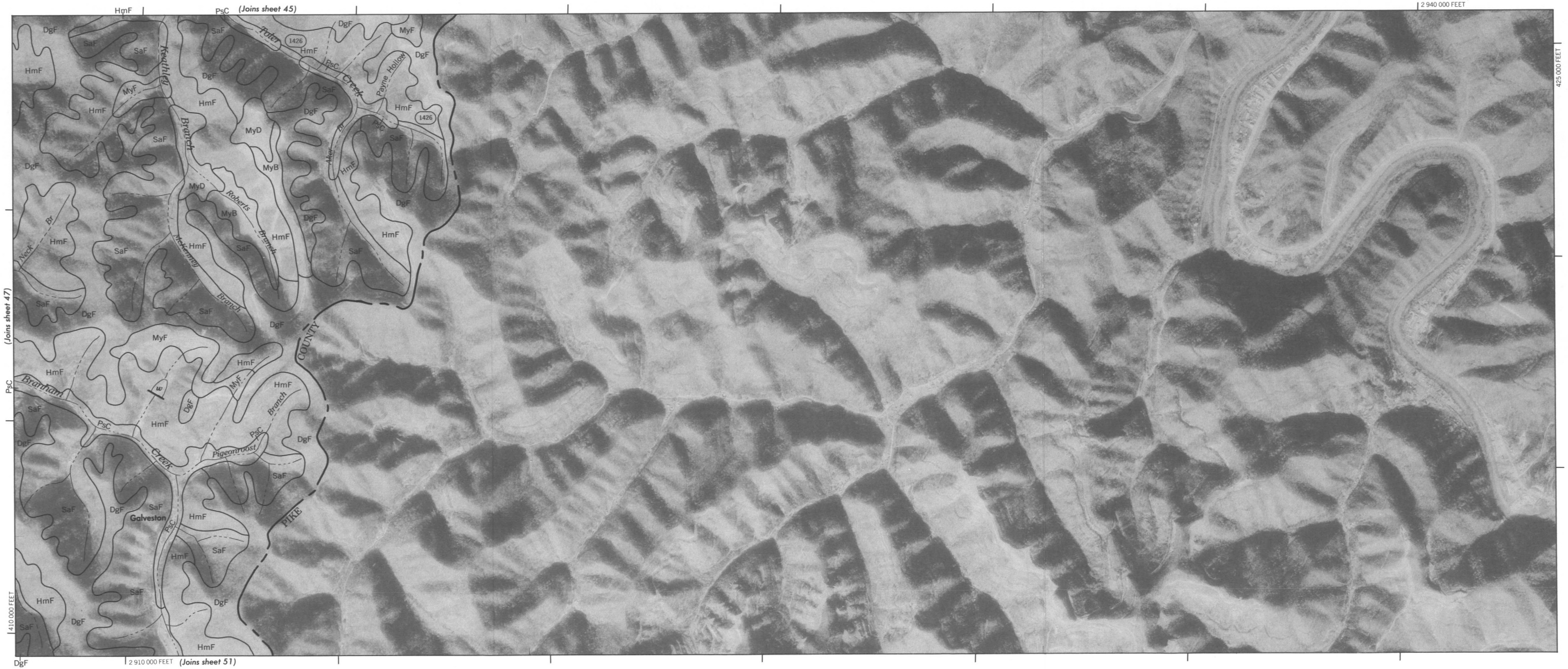
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

48

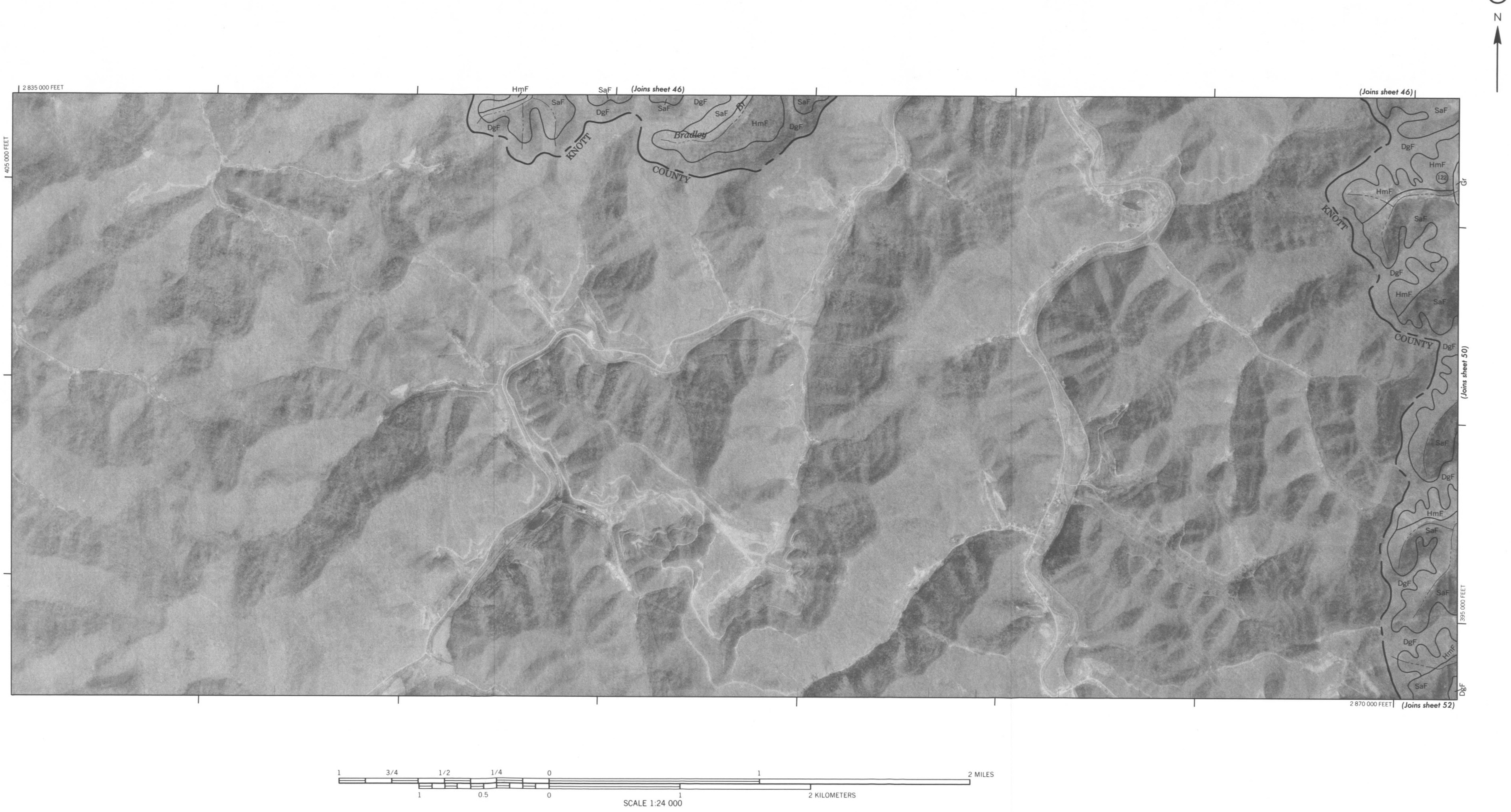
N



1 3/4 1/2 1/4 0 1 2 MILES

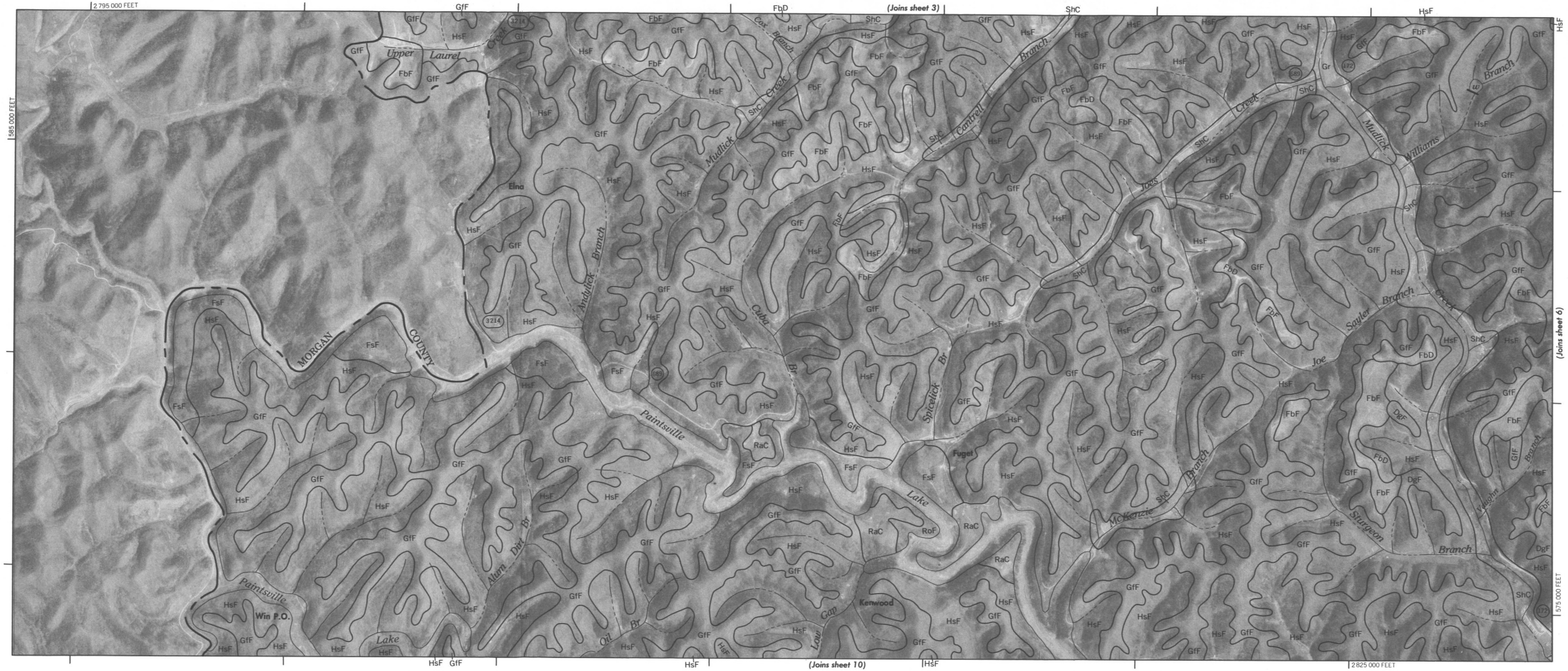
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


N
2 835 000 FEET
405 000 FEET
(Joins sheet 46)
(Joins sheet 46)
HmF
SaF
DgF
KNOTT
COUNTY
Bradley
Br
Gr
122
(Joins sheet 50)
395 000 FEET
2 870 000 FEET
(Joins sheet 52)
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

5

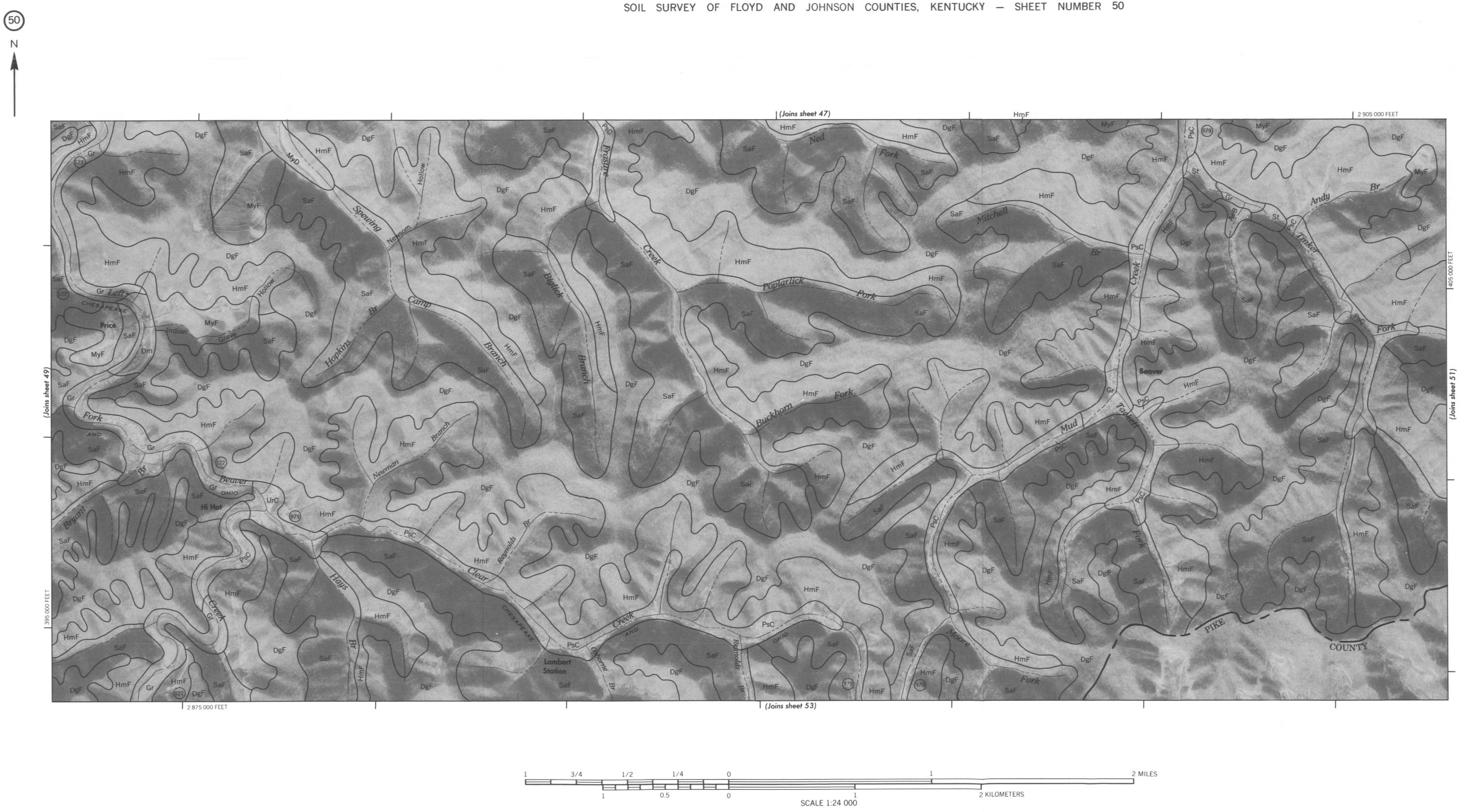
N



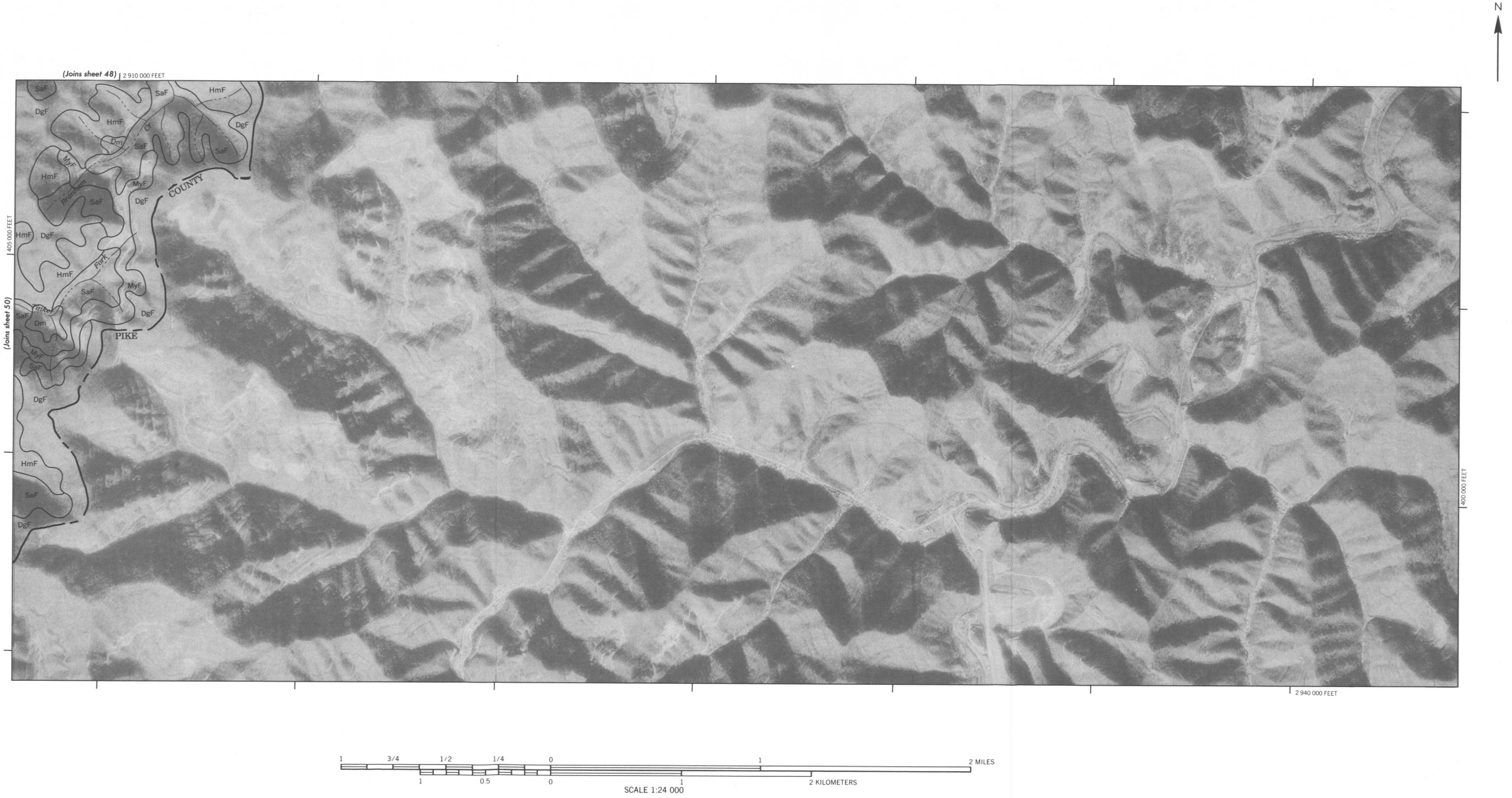
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

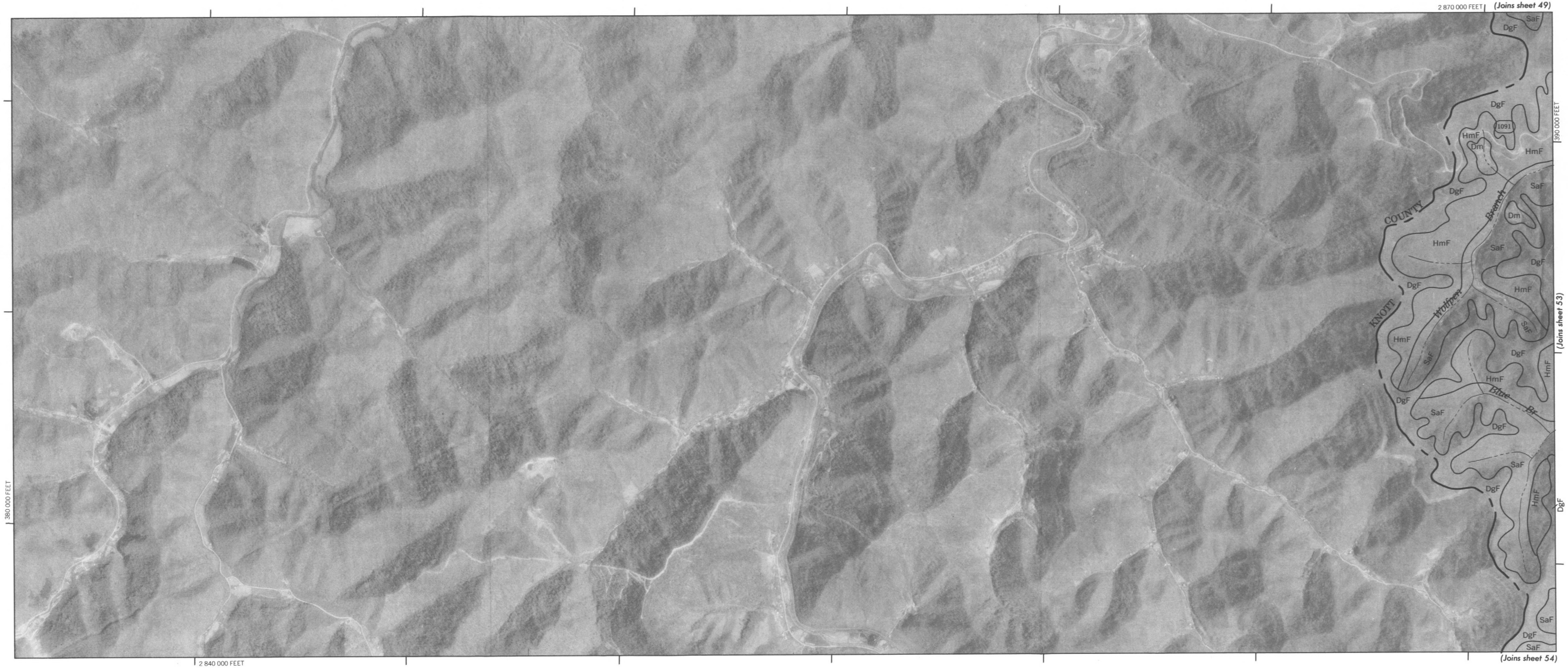


FLOYD & JOHNSON, KENTUCKY NO. 50


N
(Joins sheet 48)
2 910 000 FEET
(Joins sheet 50)
405 000 FEET
400 000 FEET
2 940 000 FEET
SaF
DgF
HmF
SaF
HmF
DgF
Dm
Cr
SaF
SaF
MyF
HmF
Branham
SaF
MyF
DgF
COUNTY
HmF
DgF
Fork
HmF
MyF
SaF
Tinker
SaF
Dm
DgF
PIKE
MyF
SaF
DgF
HmF
SaF
DgF
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

52

N

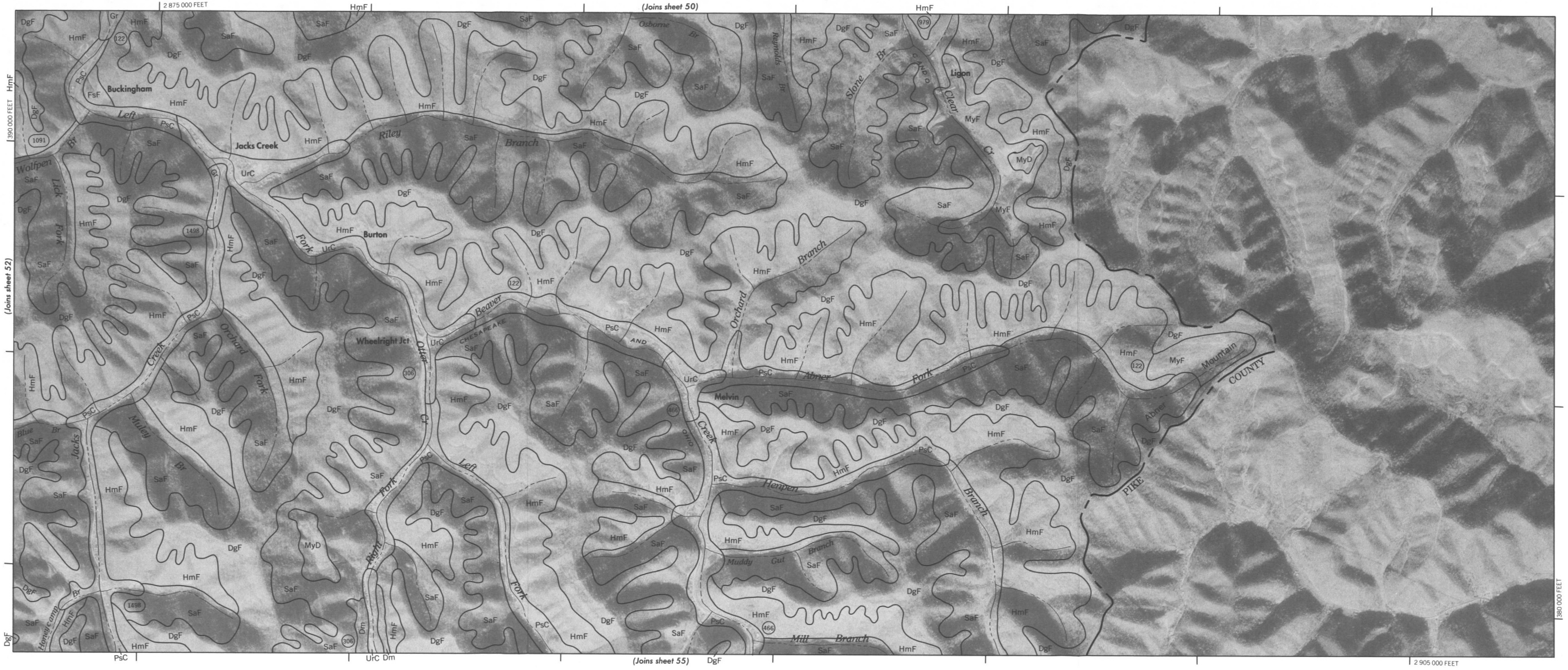


1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N



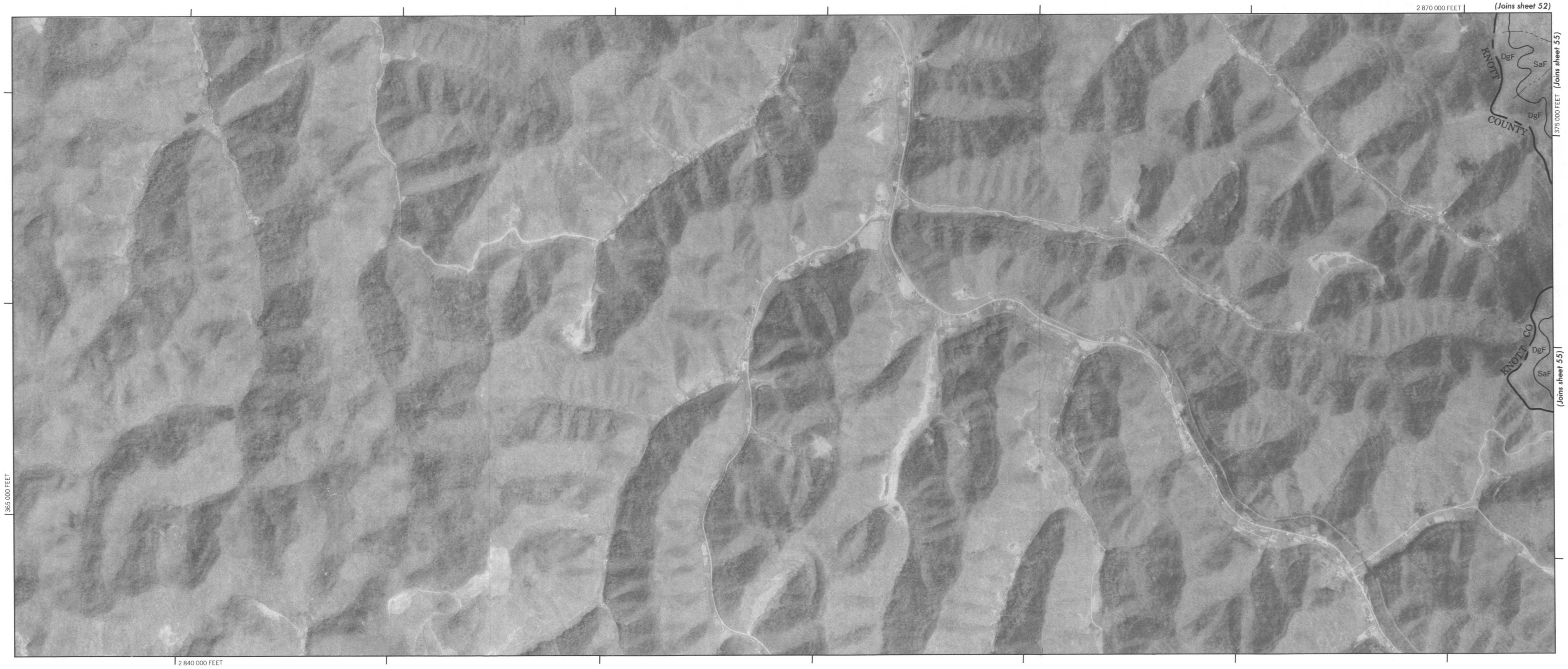
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

54

N



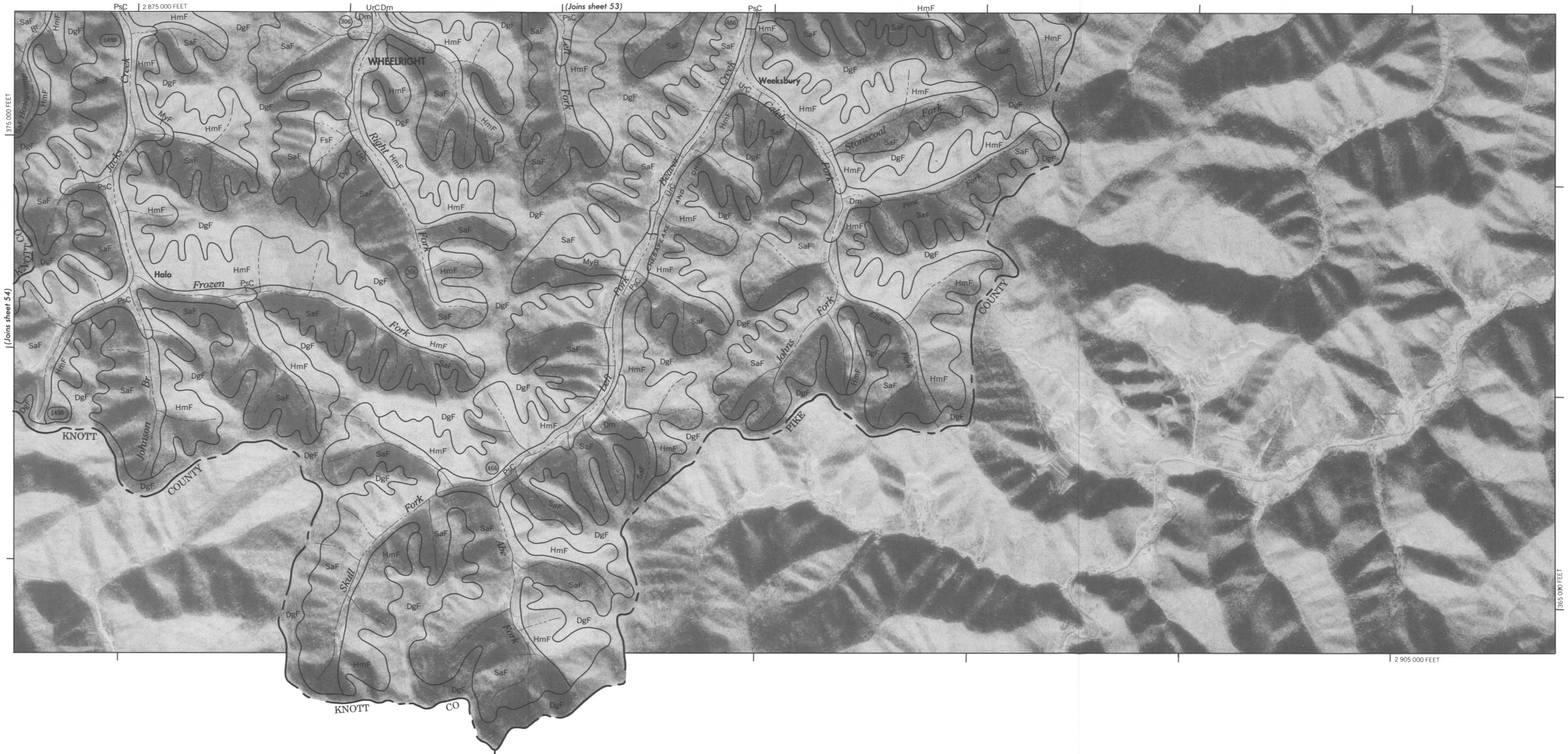
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

55

N



1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

6

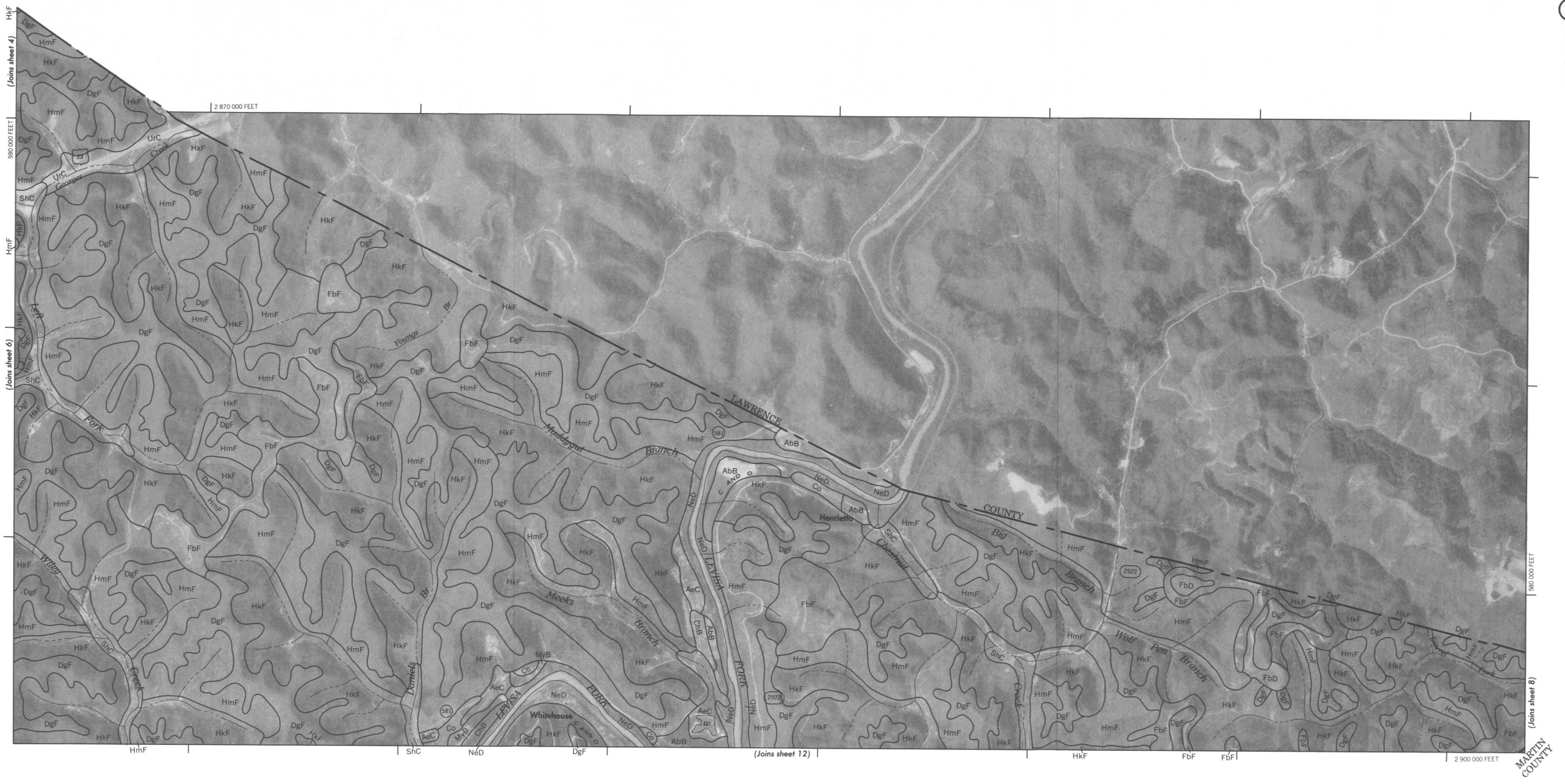
N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

FLOYD & JOHNSON, KENTUCKY NO. 7



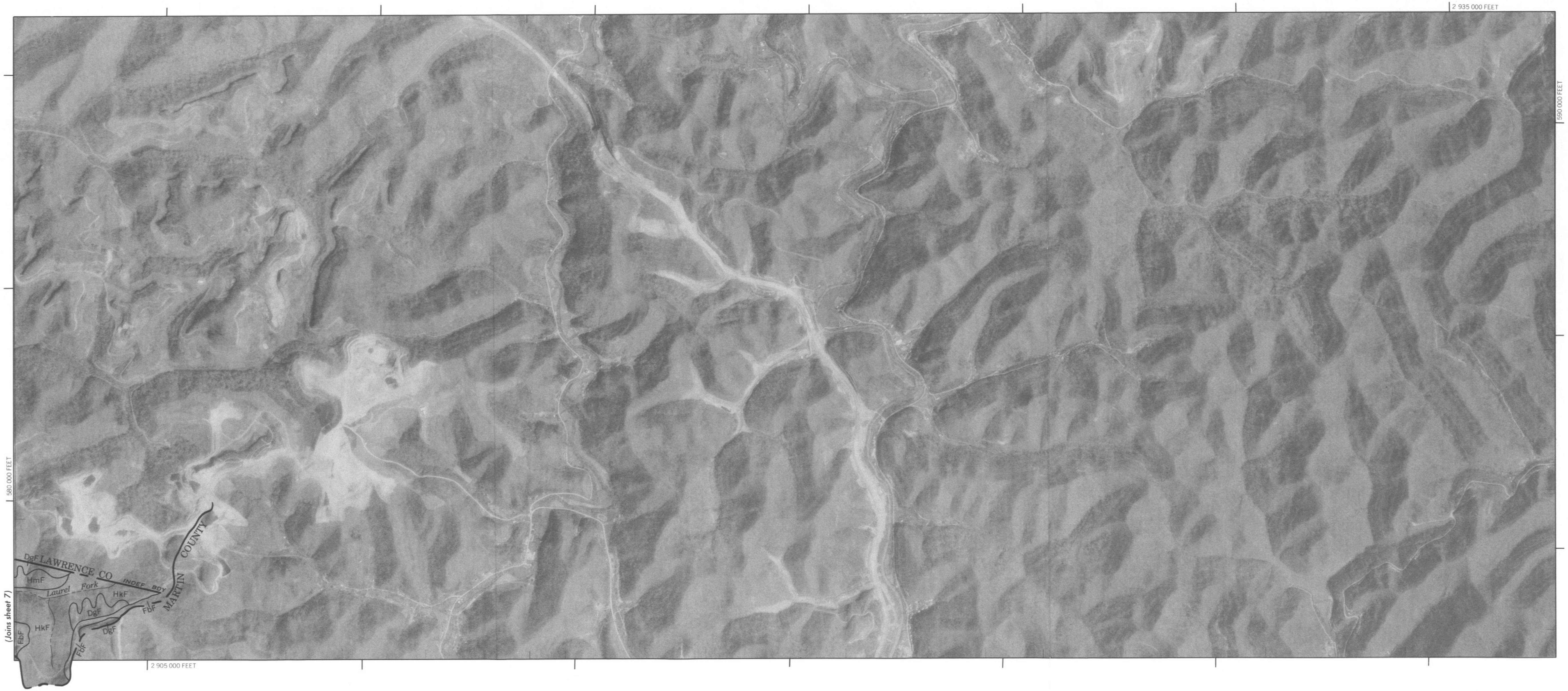
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

8

N



1 3/4 1/2 1/4 0 1 2 MILES

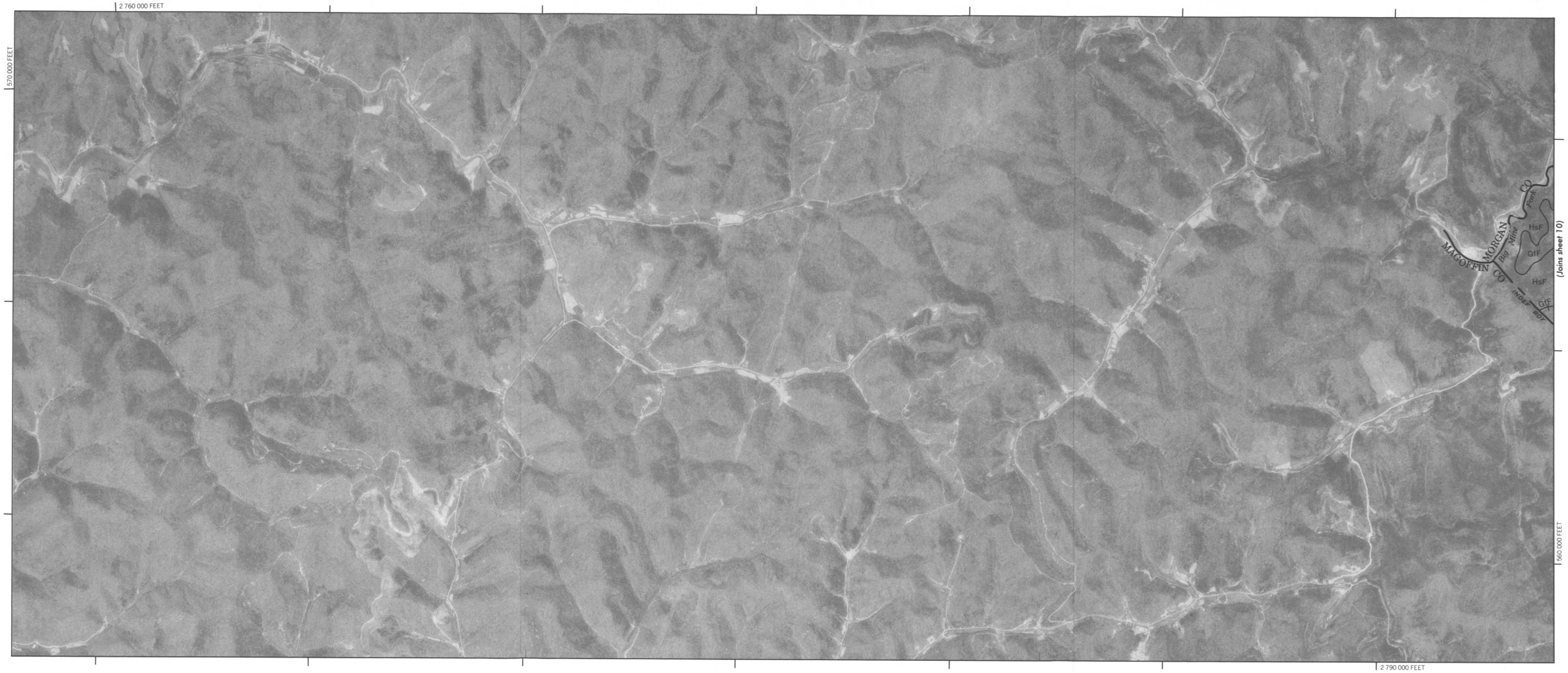
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

9

N

FLOYD & JOHNSON, KENTUCKY NO. 9



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000